ELECT EXTRA-TROPICAL PLANTS

JSTRIAL CULTURE OR NATURALISATION,

WITH INDICATIONS OF THEIR NATIVE COUNTRIES
AND SOME OF THEIR USES.

BARON FERD. VON MUELLER,
K.C.M.G., M.D., PH.D., F.R.S.

"Omnia enim in usus suos creata sunt."—SYRACH. xxxix. 21, 26.

INDIAN EDITION.

CALCUTTA:
OFFICE OF THE SUPERINTENDENT OF GOVERNMENT PRINTING.
1880.

CALCUTTA:
PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING,
8, HASTINGS STREET.

TO

COLONEL THE HONOURABLE SIR ANDREW CLARKE,

K.C.M.G., C.B., C.I.E.,

FIRST COMMISSIONER OF PUBLIC WORKS OF INDIA,

AN ENLIGHTENED AND GENEROUS PATRON OF INDUSTRIAL PROGRESS,

THIS VOLUME IS

RESPECTFULLY DEDICATED.

PREFACE.

IN the volumes issued by the Victorian Acclimation Society from 1871 to 1878 five contributions have appeared concerning such industrial plants as are available for culture in extra-tropical countries or in high mountain-regions within the tropics. These writings were mainly offered with a view of promoting the introduction and diffusion of the very many kinds of plants which in temperate geographic latitudes may be extensively reared in forests, on fields or pastures. The work thus originated, however, became accessible merely to the members of the Society, while frequent calls arose for these or some similar data not only throughout the Australian communities, but also abroad. The whole has therefore now been reissued in a rearranged and largely supplemented form, and in this instance for use in Upper India under the auspices of the Central Government at Calcutta, which honoured me in reprinting this work with its present numerous additions; and it devolves on me to add that this reissue met with the ready concurrence of the Honourable Sir Bryan O'Loghlen, Bart., Acting Chief Secretary of Victoria. As stated in the preface to the original essays, they did not claim completeness either as a specific index or as a series of notes on the respective technologic applicability of the plants enumerated. But what these writings perhaps may aspire to is the aim of bringing together, closely arrayed, some condensed data in popular language on all the principal utilitarian plants hitherto known to prosper in extra-tropical zones. Information of this kind is widely scattered through many and often voluminous works in several languages, yet such volumes apply chiefly to countries with a climatic zone

far more narrow than that of the colony for which these pages originally were mostly written. Only a few of the books which it was desirable to consult were at my command; hence the necessity of successive further supplements, even irrespective of needful references to future discoveries, because in the progress of geographic, medical, technologic, and chemical inquiries many new plants of utilitarian value are likely to be disclosed, and new uses of known plants to be elucidated. Thus, for instance, among the trees and shrubs or herbs and grasses occurring in the middle and higher altitudinal zones of Africa, or nearer to us of New Guinea and the Sunda Islands, many specific forms may be expected to occur, which we could transfer to other extra-tropical countries or to mountains in equinoctial regions. Indeed, the writer would modestly hope that his local efforts may prove to be of usefulness also in other parts of the globe, and in this hope he is cheered by the generous action of an enlightened American, Mr. Ellwood Cooper, the Principal of the Santa Barbara College of California, who deemed the publications, first offered for Australian use, also worthy of reissue in America. Moreover, gradual or partial reprints appeared also in weekly journals of Sydney and San Francisco and some other periodicals. It was stated before that the rapid progress of tillage almost throughout all colonial dominions is causing more and more a desire for general and particular indications of such plants, which a colder clime excludes from the northern countries, where many of the colonists spent their youth; and it must be clear to any reflecting mind that in all warmer latitudes, as compared with the Middle-European zones, a vastly enlarged scope exists for cultural choice of plants. Indicative as these notes merely are, yet they may thus facilitate the selection. More extensive information can then be followed up in larger works extant elsewhere, or which authorship may call forth for local requirements in other countries. The writer should even not be disinclined, under fair support and encouragement, to issue collateral to the present volume also another, exclusively devoted to the industrial plants of the hotter zones for the promotion of tropical culture, particularly in our Australian continent. Considerable difficulty was experi-

enced in drawing the limits of the remarks admissible into the present pages, because a certain plant may be important only under particular climatic conditions and cultural applications, or it may have been overrated in regard to the copiousness and relative value of its yield. Thus it was not alway easy to sift the chaff from the grain when these notes were gathered; they might under less rigorous restrictions indeed have been indefinitely extended; and although the author for more than twenty years has been watching for industrial tests the plants introduced by him into the Melbourne Botanic Garden, he had still to a very large extent to rely implicitly on the experience of other observers elsewhere. Here also it may at once be stated that in all instances when calculations of measurements and weights were quoted, such represent the maximum always, as far as hitherto on record. To draw prominent attention to the primarily important among the very many hundreds of plants referred to in these pages, the leading species have been designated with an asterisk. It has not been easy in numerous instances to trace the first sources of that information on utilitarian plants which we find recorded in the various volumes of phytologic or technologic literature; many original observations are, however, contained in the writings of Bernardin, Bentley, Brandis, Brockhaus, Candolle, Chambers, Collins, Drury, Flueckiger, Asa Gray, Grisebach, Hanbury, Hooker, King, Langethal, Lawson, Lindley, Lorentz, Loudon, Martius, Masters, Meehan, Michaux, Nuttall, Oliver, Pereira, Philippi, Porcher, Rosenthal, Roxburgh, Seemann, Simmonds, Stewart, Trimen, Wittstein, and also some others to whose names reference is made cursorily in the text. The volumes of the Agricultural Department of Washington, of the Austrian Apotheker-Verein, of the Journal of Applied Science, of the Bulletin de la Société d'Acclimation de France, and of several other periodicals, have likewise afforded data utilised on this occasion.

In grouping together, at the close of this volume, all the genera enumerated, according to the products which they yield, facility is afforded for tracing out any series of plants about which special economic information may be sought, or which may prominently

engage at any time the attention of the cultivator, the manufacturer, or the artisan. Again, in placing together in index form the respective industrial plants according to their geographic distribution, as has likewise been done in the concluding pages, it is rendered easy to order or obtain from abroad the plants of such other countries with which any settlers or colonists may be in relation through commercial, literary, or other intercourse. Lists like the present may aid also in naming the plants and their products with scientific correctness in establishments of economic horticulture or in technologic or other educational collections. If the line of demarkation between the plants admissible into this list and those which should have been excluded has occasionally been extended in favour of the latter, then it must be pleaded that the final value of any particular species for a peculiar want, locality, or treatment cannot often be fully foretold. Many plants of primary importance for rural requirements alluded to now have long since been secured by the intelligent early pioneers of immigration, who timely strove to enrich also the cultural resources of their adopted country; and in the seefforts the writer, so far as his public or private means did ever permit, has endeavoured for the past quarter of a century to take an honourable share. But although such plants are introduced, they are not in all instances as yet widely diffused, nor in all desirable localities tested. For the sake of completeness even the most ordinary cultural plants have not been passed, as the opportunity seemed an apt one to offer a few cursory remarks on their value. The writer entertains a hope that a copy of this plain volume will be placed in the library of any State schools, to serve educational purposes also by occasional and perhaps frequent reference to these pages. The increased ease of communication, which has latterly arisen between nearly all parts of the globe, places us now also in a fair position for independent efforts to suggest or promote introductions of new vegetable treasures from unexplored regions, or to submit neglected plants of promising value to unbiassed original tests. It may merely be instanced that, after the lapse of more than three centuries since the conquest of Mexico, only the most scanty information is

extant on the timber of that empire, and that of several thousand tropical grasses not many dozen have been tried with chemical exactitude for pastoral purposes. For inquiries of such kind every civilised State is striving to afford in well-planned, thoughtfully directed, and generously supported special scientific establishments the needful aid, not merely for adding to the prosperity, comfort, and enjoyment of the present generation, but also with an anticipation of earning the gratitude of prosperity; and this as a rule is done with a sensitive jealousy to maintain also thereby for scientific dignity and industrial development the fair fame of the country. Friendly consideration will recognise that a desire to arouse more and more such a spirit for emulation has much inspired the writer to offer these pages, he trusting that enlightened statesmanship far and wide will foster this aim in the liberal and circumspect manner evinced by the Government of the Indian Empire.

Melbourne, December 1878.

SELECT PLANTS

READILY ELIGIBLE FOR INDUSTRIAL CULTURE

IN

EXTRA-TROPICAL COUNTRIES.

Aberia Caffra, Hooker.

The Kai Apple of Natal and Caffraria. This tall shrub serves for hedges. The rather large fruits are edible, and can be converted into preserves. Allied South African species are A. Zeyberi and A. tristis (Sonder).

Acacia acuminata, Bentham.

A kind of Myall from Western Australia, attaining a height of 40 feet. The scent of the wood comparable to that of raspberries. It is the best of West Australian woods for charcoal. The stems much sought after for fence posts, very lasting, even when young. A similar tree with hard and scented wood is A. Doratoxylon (A. Cunn.).

Acacia Arabica, Willdenow.

North and Central Africa, also in South-West Asia, growing in dry, calcareous soil. This small tree can be utilised for thorny hedges, as also A. Seyal (Delile) and A. tortilis (Forskael). They all furnish the best gum arabic for medicinal and technical purposes. The lac insect lives also on the foliage, and thus in Sind the lac is mainly yielded by this tree. The stem attains a circumference of 10 feet. The astringent pods are valuable for tanning, also the bark, which is known as "Baboot" bark; the wood, known as "Sunt," is very durable if water-seasoned, extensively used for wheels, well-curbs, and many kinds of implements, also for the knees and planks of boats. A. gummifera (Willd.) and A. Ehrenbergiana (Hayne) are among the species, which yield gum arabic in North Africa. A. latronum (Willdenow) and A. modesta (Wallich) form thorny hedges in India (Brandis).

Acacia armata, R. Brown.

Extra-tropical Australia. The Kangaroo Thorn. Much grown for hedges, though less manageable than various other hedge plants. Important for covering coast sand with an unapproachable prickly vegetation.

Acacia Catechu, Willdenow.

India, Africa, up to 3,000 feet. Tree of 40 feet height. The extract prepared from the bark and heartwood is the catechu of medicine or cutch of tannery. Pure cutch is worth about £25 per ton; 4 tons of bark will produce 1 ton of cutch or terra japonica. A. Suma (Kurz) is closely allied.

Acacia Cavenia, Hooker and Arnott.

The Espino of the present inhabitants of Chili, the Cavan of the former population. A small tree with exceedingly hard wood, resisting underground moisture. The plant is well adapted for hedges. The pods, called Quirinca, serve as cattle food (Dr. Philippi). The husks contain 32 per cent. tannin (Sievers), valuable as a dye material.

Acacia Cebil, Grisebach.

La Plata States. This is one of the most useful of all trees there, on account of its bark, which is exceedingly rich in tannic acid; well worthy of introduction here; also as an ornamental tree. Numerous other Acaciæ, particularly the Australian species, deserve yet tests for tannin.

Acacia concinna, Candolle.

India. Praised by Dr. Cleghorn as a valuable hedge shrub. The pod contains saponin. So is likewise A. latronum (Willd.), a hedge bush.

Acacia decurrens, Willdenow, *var.* **mollissima.*** (*A. mollissima,* Willd.)

The Black Wattle. From the eastern part of South Australia, through Victoria and New South Wales, to the southern part of Queensland; in open plains a small or middle-sized tree, in deep forest recesses a lofty tree of singularly rapid growth. Its wood can be used for staves and many other purposes, and it supplies an excellent firewood, but a chief use would be to afford the first shelter, in treeless localities, for raising forests. Its bark, rich in tannin, and its gum, not dissimilar to gum-arabic, render this tree highly important. The English price of the bark ranges generally from £8 to £11. In Melbourne

it averages about £5 per ton. It varies, so far as experiments made in my laboratory have shown, in its contents of tannin from 30 to 54 per cent. in bark artificially dried. In the mercantile bark the percentage is somewhat less, according to the state of its dryness—it retaining about 10 per cent. moisture. 1½ lbs. of Black Wattle bark gives 1 lb. of leather, whereas 5 lbs. of English Oak bark are requisite for the same results, but the tannic principle of both is not absolutely identical. Melbourne tanners consider a ton of Black Wattle bark sufficient to tan 25 to 30 hides; it is best adapted for sole leather and other so-called heavy goods. The leather is fully as durable as that tanned with oak bark and nearly as good in colour. Bark carefully stored for a season improves in tanning power 10 to 15 per cent. From experiments made under the author's direction it appears that no appreciable difference exists in the percentage of tannin in Wattle bark, whether obtained in the dry or in the wet season. The tannin of this Acacia yields a grey precipitate with the oxyde salts of iron, and a violet colour with sub-oxydes; it is completely thrown down from a strong aqueous solution by means of concentrated sulphuric acid. The bark improves by age and desiccation, and yields about 40 per cent. of catechu, rather more than half of which is tannic acid. Bichromate of potash added in a minute quantity to the boiling solution of mimosa-tannin produces a ruby-red liquid, fit for dye purposes: and this solution gives, with the salts of sub-oxyde of iron, black pigments; and with the salts of the full oxyde of iron, red-brown dyes. As far back as 1823 a fluid extract of Wattle bark was shipped to London, fetching then the extraordinary price of £50 per ton, one ton of bark yielding 4 cwt. of extract of tar consistence (Simmons), thus saving much freight and cartage. For cutch or terra japonica the infusion is carefully evaporated by gentle heat. The estimation of tannic acid in Acacia barks is effected most expeditiously by filtering the aqueous decoction of the bark after cooling, by evaporating and then re-dissolving the residue in alcohol and determining the weight of the tannic principle obtained by evaporating the filtered alcoholic solution to perfect dryness.

The cultivation of the Black Wattle is extremely easy, being effected by sowing either broadcast or in rows. Seeds can be obtained in Melbourne at about 5 shillings per lb., which contains from 30,000 to 50,000 grains; they are known to retain their vitality for several years. Seeds should be soaked in warm water before sowing. Any bare, barren, unutilised place might most remuneratively be sown with this Wattle Acacia; the return would be in from 5 to 10 years. Full-grown trees,

which supply also the best quality, yield as much as 1 cwt. of bark. Mr. Dickinson states that he has seen 10 cwt. of bark obtained from a single tree of gigantic dimensions. The rate of growth of the tree is about 1 inch in diameter of stem annually. It is content with the poorest and driest or sandy soil, although in more fertile ground it shows greater rapidity of growth. This Acacia is perhaps the most important of all tan-yielding trees of the warm temperate zones, for its strength in tannic acid, its rapidity of growth, its contentedness with almost any soil, for the ease with which it can be reared and for its early yield of tanner's bark, and indeed also gum and stave-wood.

The variety *dealbata* (*Acacia dealbata*, Link) is generally known amongst Australian colonists as Silver Wattle. It prefers for its habitation humid river-banks, and attains there a height of sometimes 150 feet, supplying a clear and tough timber used by coopers and other artisans, but principally serving as select fuel of great heating power. The bark of this variety is much thinner and greatly inferior to the Black Wattle in quality, yielding only about half the quantity of tanning principle. It is chiefly employed for lighter leather. This tree is distinguished from the Black Wattle by the silvery or rather ashy hue of its young foliage; it flowers early in spring, ripening its seeds in about 5 months, while the Black Wattle blossoms late in spring or at the beginning of summer, and its seeds do not mature before about 14 months.

Acacia falcata, Willdenow.

East Australia. One of the best of trees for raising a woody vegetation on drift-sand, as particularly proved at the Cape of Good Hope. Important also for its bark in tanneries.

Acacia Farnesiana, Willdenow.

Dioscorides' small Acacia. Indigenous to South Asia; found westward as far as Japan; a native also of the warmer parts of Australia, as far south as the Darling River; found spontaneously in tropical and sub-tropical America, but apparently not in tropical Africa. Professor Fraas has recognised in this Acacia the ancient plant. The scented flowers are much sought after for perfumery. This may also be utilised as a hedge plant, and a kind of gum-arabic may be obtained from it.

Acacia fasciculifera, F. v. Mueller.

South Queensland. Seventy feet high, branches pendent. Desirable for culture on account of the excellence of its easily-worked dark wood.

Acacia glaucescens, Willdenow.

Queensland and New South Wales. Extreme height about 60 feet. A kind of Myall, with hard, dark, prettily grained, but less scented wood than that of some other species.

Acacia harpophylla, F. v. Mueller.

Southern Queensland, where this tree, according to Mr. Thozet, furnishes a considerable share of the mercantile wattle bark for tanning purposes. Wood, according to Mr. O'Shanesy, brown, hard, heavy and elastic, used by the natives for spears. Mr. Thozet observes that the tree attains sometimes a height of 90 feet, growing naturally on sand lands, almost to the exclusion of other trees and shrubs, furnishing wood of a violet odour, splitting freely and used for fancy turnery. The tree yields also considerable quantities of gum.

Acacia homalophylla, Cunningham.

The Victorian Myall, extending into the deserts of New South Wales. The dark-brown wood is much sought for turners' work on account of its solidity and fragrance; perhaps its most extensive use is in the manufacture of tobacco pipes. Never a tall tree.

Acacia horrida, Willdenow.

The Doornboom or Karra-Doorn of South Africa. A formidable hedge bush with thorns often 3 inches long, readily available for impenetrable hedge copses. It exudes also a good kind of gum, but often of amber colour: so A. Giraffæ, Burchell, which attains a great age; the trunk assumes a large size, furnishing a wood of great hardness.

Acacia implexa, Bentham.

Victoria, New South Wales, Queensland. A tree of middle size, content with poor soil. Wood firm and close, dark brown with yellowish stripes; much in demand for turnery, cog-wheels, and other purposes which need tenacity and strength (Dickinson). Bark available for tanneries.

Acacia longifolia, Willdenow.

South-Eastern Australia. This tree is introduced into this list inasmuch as the very bushy variety known as A. Sophoræ (R. Brown) renders most important services in subduing loose coast-sand; it should therefore be disseminated on extensively bare sand-shores. To the recommendations of this bush can be added that it grows so quickly. The bark of A. longifolia is

only half as good as that of A. decurrens for tanning, and used chiefly for sheep-skins. The tree is, however, also of quick growth—20 to 30 feet in 5 to 6 years (Hartmann).

Acacia macrantha, Bentham.

From Mexico to Argentina; also in the Galapagos group. This tree, usually small, provides the "Cuji-pods" for tanning (Simmonds).

Acacia melanoxylon, R. Brown.*

The well-known Blackwood of our river flats and moist forest valleys, passing also under the inappropriate name of Light Wood. In irrigated glens of deep soil the tree will attain a height of 80 feet, with a stem several feet in diameter. The wood is most valuable for furniture, railway carriages, boat-building, casks, billiard tables, pianofortes (for sound-boards and actions), and numerous other purposes. The fine-grained wood is cut into veneers. It takes a fine polish, and is considered almost equal to Walnut. Our best wood for bending under steam. The air-dried bark contains from 15 to 28 per cent. tannin. For further details refer to the volumes of the Melbourne Exhibitions of 1862 and 1867.

Acacia microbotrya, Bentham.

In the waterless interior of South-West Australia. The "Bad-jong." A comparatively tall species, which, according to Mr. Geo. Whitfield, produces often 50 lbs. of gum from one tree in a season. The aborigines store the gum in hollow trees for winter use; it is of a pleasant, sweetish taste.

Acacia pendula, All. Cunningham.

New South Wales and Queensland. Generally in marshy tracts of the interior. One of the Myall trees.

Acacia penninervis, Sieber.

Victoria, New South Wales, and Queensland. A small tree, so hardy as to occupy sub-alpine localities. The bark contains about 18 per cent. of tannin.

Acacia pycnantha, Bentham.*

Victoria and South Australia. The Golden or Green Wattle of the colonists. This tree, which attains a maximum height of about 30 feet, is second perhaps only to A. decurrens in importance for its yield of tanner's bark; the quality of the latter is even sometimes superior to that of the Black Wattle,

but its yield is less, as the tree is smaller and the bark thinner. It is of rapid growth, content with almost any soil, but is generally found in poor sandy ground near the sea-coast, and thus also important for binding rolling sand. Experiments instituted by me have proved the artificially dried bark to contain from 30 to 45 per cent. tanning principle, full-grown sound trees supplying the best quality. The aqueous infusion of the bark can be reduced by boiling to a dry extract, which in medicinal and other respects is equal to the best Indian catechu, as derived from Acacia catechu and A. suma. It yields about 30 per cent., about half of which or more is mimosa-tannic acid. This catechu is also of great use for preserving against decay articles subject to exposure in water, such as ropes, nets, fishing-lines, &c. While, according to Mr. Simmons, the import of the bark of oaks, hemlock-spruce, into England becomes every year less, and while the import of sumach and gambir does not increase, the annual demand for tanning substance has since the last twenty years been doubled. A. pycnantha is also important for its copious yield of gum, which is in some localities advantageously collected for home consumption and also for export. By improved methods the fragrant oil of the flowers would doubtless be fixed, though its absolute isolation might be difficult and unremunerative.

Acacia retinodes, Schlechtendal.

South-East Australia. Ascertained already in 1846 by Dr. Hermann Behr to yield a good tanner's bark and much gum. This Acacia is ever-flowering, and in this respect quite exceptional. It likes river banks, but never grows beyond the height of a small tree.

Acacia saligna, Wendland.*

South-West Australia, where it is the principal tree chosen for tanner's bark. It is a wide-spreading small tree, fit for avenues. The bark contains nearly 30 per cent. of mimosa-tannin, and is extensively used by tanners in West Australia. The tree has proved in Algeria to resist the sirocco better than most species (Dr. Bonand). A. cyanophylla (Lindley) is a closely allied species, serving the same purposes.

Acacia Seyal, Delile.

In the Libyan and Nubian deserts. This thorny tree exudes a brownish kind of gum-arabic. It is adapted for the most arid desert country. In any oasis it forms a large and shady tree. Native name "Soffar."

Acacia stenophylla, A. Cunningham.

On banks of water-courses in the interior of Australia, as far south as the Murray River. A tree with exquisite, hard, dark wood, serving like Myall-wood.

Acacia Verek, Guillemin & Perrottet.

From Senegambia to Nubia. Affords the best white gum-arabic of the Nile region, and a large quantity of this commercial article. A. Etbaica (Schweinf.) and A. Stenocarpa (Hochst.) from the same region produce also a good mercantile gum.

Acanthosicyos horrida, Welwitsch.

In the deserts of Angola, Benguela, and Damarland. This thorny, cucurbitaceous, erect shrub bears fruits of orange size and colour, of pleasant acidulous taste. The seeds are also edible. The plant will live in the most arid desert land, and is one of the few which resist the scorching effects of even the sirocco.

Acer campestre, Linné.

The British Maple. Extends from Middle Europe to North Asia. Height 40 feet, in shelter and deep soil; the yellow and purple tints of its foliage in autumn render the tree then particularly beautiful. The wood is compact and fine-grained, and sought for choice furniture. The tree can be trimmed for hedge-growth. Comparatively quick of growth, and easily raised from seed. These remarks apply to many kinds of Maples.

Acer dasycarpum, Ehrhart.

The White Maple of North America. Likes rather a warmer climate than the other American Maples, and therefore particularly desirable for us here. Height 50 feet; wood pale and soft, stem sometimes 9 feet in diameter. Much praised for street-planting; growth comparatively rapid. It produces no suckers, nor is the tree subject to disease. A most beautiful tree, with a stout stem and a magnificent crown, growing best on the banks of rivers with limpid water and a gravelly bed, but never in swampy ground, where the Red Maple takes its place. The wood is of less strength and durability than that of its congeners, but produces excellent charcoal. The tree also yields Maple-sugar, though not in such quantity as A. saccharinum.

Acer macrophyllum, Pursh.

Large Oregon Maple. Tree up to 90 feet high, of quick

growth; stem attaining 16 feet in circumference; wood whitish, beautifully veined. A beautiful shade-tree; delights on banks of streams. The inner bark can be utilised for baskets and superior mats; the wood is a substitute for hickory. The curled wood is splendid for ornamental work.

Acer Negundo, Linné.

The Box Elder of North America. A tree, deciduous like the rest of the Maples; attains a height of about 50 feet, and is rich in saccharine sap; according to Vasey it contains almost as much as the Sugar Maple. Proved well adapted for our country. In California it is used extensively as a shade-tree. Cultivated, the stem attains about 8 inches in diameter in 8 years (Brewer). The wood is yellow, marked with violet and rosy veins (Simmonds).

Acer niveum, Blume.

Continental and Insular India, up on the forest ranges. This is the tallest of the Maples, attaining a height of 150 feet. Several other large Maples worthy of cultivation, particularly in parks, occur on the mountains of India.

Acer palmatum, Thunberg.

This beautiful tree, with deeply cleft leaves, is indigenous to Japan, where various varieties with red- and yellow-tinged leaves occur. Should it be an aim to bring together all the kinds of Maples, which could be easily grown in appropriate spots, then Japan alone would furnish 25 species.

Acer platanoides, Linné.

The Norway Maple, extending south to Switzerland. Up to 70 feet high. The pale wood much used by cabinet-makers. Tint of the autumn foliage golden yellow. A tree of imposing appearance, much recommended for ornamental gardening; it gives a denser shade than most of the other Maples.

Acer pseudo-platanus, Linné.

Middle and South Europe, West Asia. The Sycamore Maple or Spurious Plane. Attains a height of over 100 feet. The wood is compact and firm, valuable for various implements, instruments, and cabinet-work;—for instance, for mangles, presses, dishes, printing and bleaching works, beetling beams, and in foundries for patterns (Simmonds). It furnishes like some other Maples a superior charcoal. Will admit of exposure to sea air. The sap also saccharine.

Acer rubrum, Linné.

The Red Maple of North America. A tree, attaining 80 feet; wood close-grained. Grows well with several other Maples, even in dry, open localities, although the foliage may somewhat suffer from hot winds, but thrives most luxuriantly in swampy, fertile soil. It is valued for street-planting. The foliage turns red in autumn. The wood is of handsome appearance, used in considerable quantity for saddle-trees, yokes, chairs, and other furniture. That of old trees is sometimes cross-grained, and thus furnishes a portion of the curled Maple-wood, which is very beautiful and much in request for gun-stocks and inlaying. The tree yields also Maple-sugar, but, like A. dasycarpum, only in about half the quantity obtainable from A. saccharinum (Porcher).

Acer saccharinum, Wangenheim.*

The Sugar or Rock Maple; one of the largest of the genus. It is the national emblem of Canada. In the colder latitudes of North America 80 feet high. The wood is strong, tough, hard, close-grained, of rosy tinge, and when well seasoned used for axle-trees, spokes, shafts, poles, and furniture; when knotty or curly it furnishes the Birdseye and Curly Maple-wood. In the depth of winter the trees, when tapped, will yield the saccharine fluid, which is so extensively converted into Maple-sugar, each tree yielding 2 to 4 lbs. a year. The trees can be tapped for very many years in succession, without injury. According to Porcher, instances are on record of 33 lbs. of sugar having been obtained from a single tree in one season. The tapping process commences towards the end of winter. The Sugar Maple is rich in potash, furnishing a large proportion of this article in the United States. The bark is an important constituent in several of the American dyes. The tree is particularly recommended for our Alpine regions. It bears a massive head of foliage on a slender stem. The autumnal colouring is superb. In the eastern states of North America the Sugar Maple is regarded as the best tree for shade-avenues. Numerous other Maples exist, among which as the tallest may be mentioned Acer Creticum, L., of South Europe, 40 feet; A. lævigatum, A. sterculiaceum, and A. villosum, Wallich, of Nepal, 50 feet; A. pictum, Thunb., of Japan, 30 feet.

Achillea millefolium, Linné.

Yarrow or Millfoil. Europe, Northern Asia, and North America. A perennial medicinal herb of considerable astringency, per-

vaded with essential oil, containing also a bitter principle (achillein) and a peculiar acid, which takes its name from the generic appellation of the plant.

Achillea moschata, Wulfen.

Alps of Europe. The Genipi or Iva of the Alpine inhabitants. This perennial herb ought to be transferred to our snowy mountains. With the allied A. nana (L.) and A. atrata (L.), it enters as a component into the aromatic medicinal Swiss tea. Many species of this genus, including the Yarrow, are wholesome to sheep. A. fragrantissima (Reichenbach) is a shrubby species from the deserts of Egypt, valuable for its medicinal flowers.

Achras sapota, Linné.

The Sapodilla Plum of West India and Central Continental America. A fine evergreen tree, producing delicious fruit. Achras Australis, a tree yielding also tolerably good fruit, occurs in New South Wales. Other sapotaceous trees, producing table-fruit, such as the Lucuma mammosa (the Marmalade Tree), Lucuma Bonplandi, Chrysophyllum Cainito (the Star Apple), all from West India; and Lucuma Cainito of Peru, might also be subjected to trial culture in our forest valleys; so furthermore many of the trees of this order, from which gutta-percha is obtained (species of Dichopsis Isonandra, Sideroxylon, Cacosmanthus, Bassia, Mimusops, and Imbricaria Payenia), would prove hardy in sheltered woodlands, as they seem to need rather an equable, humid, mild clime, than the heat of the torrid zone.

Aconitum Napellus, Linné.

The Monk's Hood. In the colder, especially mountainous, parts of Europe and Northern Asia. A powerful medicinal plant of perennial growth, but sometimes only of biennial duration, variable in its forms. It was first introduced into Australia, together with a number of other Aconits, by the writer of this communication. All the species possess more or less modified medicinal qualities, as well in their herb as in their root; but so dangerously powerful are they, that the plants can only be administered by the exercise of legitimate medical practice. Napellus root, according to Dr. Wittstein, contains three alkaloids: aconitin, napellin, and narcotin. The foliage contains also a highly acrid, volatile principle, perhaps chemically not unlike that of many other Ranunculaceæ. Aconitin, one of the most potent of any of the medicinal substances in existence,

can likewise be obtained from the Nepalese Aconitum ferox, and probably from several other species of the genus.

Acorus Calamus, Linné.

The Sweet Flag. Europe, Middle and North Asia, North America. A perennial pond or lake plant. The somewhat aromatic root is used as a stomachic, and also in the preparation of confectionery, in the distillation of gin and liqueurs, and in the brewing of some kinds of beer. The flavour of the root depends mainly on a peculiar volatile oil.

Acrocomia mexicana, Karwinski.

Mexico; also in the cooler regions up to 3,000 feet. (Middle temperature, 17° Celsius; Drude.) A prickly palm, 20 feet high, accompanied by very slender Chamædora-Palms in the shade of Oak-forests.

Actæa spicata, Linné.

The Baneberry. On forest mountains, mainly in limestone soil of Europe, North Asia, and North America. A perennial medicinal herb. Its virtue depends on peculiar acrid and bitter as well as tonic principles. In North America this species, and likewise A. alba, are also praised as efficacious antidotes against ophidian poisons.

Adenostemum nitidum, Persoon.

South Chili, where this stately tree passes by the appellations Queule, Nuble, and Aracua. Wood durable and beautifully veined. Fruit edible.

Adesmia balsamica, Bertero.

The Jarilla of Chili. A small shrub, remarkable for exuding a fragrant balsam of some technic value.

Ægiceras majus, Gaertner.

South Asia, Polynesia, North and East Australia. This spurious mangrove tree extends far south in New South Wales. It may be employed for staying the off-flow of mud by the tide, and for thus consolidating shores subject to inundation by sea-floods.

Æschynomene aspera, Linné.

The Solah of tropical Asia. A large perennial erect or floating swamp-plant. Introduced from the Botanic Gardens of Melbourne into the tropical parts of Australia. The pith hats are

made from the young stems of this plant. It is also a substitute for cork in various appliances. The Solah is of less importance for cultivation than for naturalisation.

Æsculus flava, Aiton.

North America. This showy tree rises to 60 feet. The wood is light, soft, and porous, not inclined to split or crack in drying. It is valuable for troughs, bread-trays, wooden bowls, shuttles (Simmons).

Æsculus Hippocastanum, Linné.

The Horse-Chestnut Tree. Indigenous to Central Asia. One of the most showy of deciduous trees, more particularly when during spring "it has reached the meridian of its glory, and stands forth in all the gorgeousness of leaves and blossoms." Height 60 feet. Circumference of stem up to 16 feet. It will succeed in sandy soil on sheltered spots; the wood adapted for furniture; the seeds a food for various domestic animals; the bark a good tanning material. The wood remains free from insects. The tree ascends the Himalayas up to 10,000 feet. A variety is known with thornless fruits. Three species occur in Japan, and several, but none of great height, in North America and South Asia.

Æsculus Indica, Colebrooke.

In the Himalayas, from 3,500 to 9,000 feet. Height finally 50 feet; trunk comparatively short, occasionally with a girth of 25 feet. Never quite without leaves. Can be used like the Horse-Chestnut as an ornamental shade-tree.

Agaricus Cæsareus, Schaeffer.

In the Spruce-forests of Middle and South Europe. Trials might be made to naturalise this long-famed and highly delicious Mushroom in our forests. It attains a width of nearly one foot, and is of a magnificent orange colour. Numerous other edible Agarics could doubtless be brought into this country by the mere dissemination of the spores at apt localities. As large or otherwise specially eligible may here be mentioned A. extinctorius L., A. melleus Vahl., A deliciosus L., A. giganteus Sowerby, A. Cardarella Fr., A. Marzuolus Fr., A. eryngii Cand., A. splendens Pers., A. odorus Bulliard, A. auricula Cand., A. oreades Bolt., A. esculentus Wulf., A. mouceron Tratt., A. socialis Cand., all from Europe, besides numerous other highly valuable species from other parts of the globe. Professor Goeppert adds as edible species sold in

Silesia and other parts of Germany: A. decorus Fries, A. fusipes Bull, A. gambosus Fries, A. procerus Scop., A. scorodonius Fries, A. silvaticus Schaef., A. virgineus Wulf., A. volemus Fries, besides the almost cosmopolitan A. campestris Linné. Mushroom beds are best made from horse-manure, mixed with ⅛ loam, the scattering of the spawn (spores) to be effected when the temperature of the hot-bed has become reduced to 85° F., the sowing of the mushroom fragments to be made 3 inches deep and 4 inches apart; one inch sifted loam over the damp bed and some hay to cover the whole. After two months, mushrooms can be gathered from the bed. In Japan mushrooms are reared on decayed split logs. Puff balls are also edible and some of them delicious (Meehan).

Agaricus flammeus, Fries.

In Cashmere a large and excellent edible mushroom (Dr. Aitchison).

Agaricus ostreatus, Jacquin.

On trunks chiefly of deciduous trees throughout Europe. The delicious Oyster Mushroom, renowned since antiquity (Fries).

Agave Americana, Linné.

The gigantic Aloe of Central America. It comes here into flower in about ten years. The pithy stem can be utilised for some of the purposes for which cork is usually employed,—for instance, to form the bottoms of insect-cases. The honey-sucking birds and the bees are very fond of the flowers of this prodigious plant. The leaves of this and some other Agaves, such as A. Mexicana, furnish the strong Pita-fibre, which is adapted for ropes, and even for beautiful textile fabrics. The strength of ropes of this fibre is considerably greater than that of hemp ropes, as well in as out of water. The leaves contain saponin. The sap can be converted into alcohol, and thus the "Pulque" beverage is prepared from the young flower-stem. Where space and circumstances admit of it, impenetrable hedges may be raised in the course of some years from Agaves.

Agave rigida, Miller. (*A. Ixtli,* Karwinsky.)

Yucatan. The Chelem, Henequen, and Sacci of the Mexicans, furnishing the Sisal hemp. Drs. Perrine, Scott, and Engelmann indicate several varieties of this stately plant, the fibre being therefore also variable, both in quantity and quality. The yield of fibre begins in four or five years, and lasts for half a century or more, the plant being prevented from flowering by cutting away its flower stalk when very young. The

leaves are from 2 to 6 feet long and 2 to 6 inches wide; the flower-stem attains a height of 25 feet, the panicle of flowers about 8 feet long, bearing in abundance bulb-like buds. Other large species of Agave, all fibre-yielding, are A. antillarum (Descourtil) from Hayti; A. Parryi (Engelmann) from New Mexico; A. Palmeri (Engelmann) from South Arizona, up to an elevation of 6,000 feet.

Agriophyllum gobicum.

Eastern Asia. The "Soulkir" of the Mongols. Przevalsky says that this plant affords a great part of the vegetable food of the Ala-Shan nomads. Several other annual salsolaceous herbs belong to the genus *Agriophyllum*.

Agrostis alba, Linné.

The Fiorin or White Bent-Grass. Europe, North and Middle Asia, North Africa, North America. Perennial, showing a predilection for moisture; can be grown on peat soil. It is the Herd-Grass of the United States. It is valuable as an admixture to many other grasses, as it becomes available at the season, when some of them fail. Sinclair regards it as a pasture-grass inferior to Festuca pratensis and Dactylis glomerata, but superior to Alopecurus pratensis. The variety with long suckers (A. stolonifera) is best adapted for sandy pastures, and helps to bind shifting sand on the sea-coast, or broken soil on river banks. It has a predilection for moisture, and luxuriates even on saline wet soil or periodically inundated places, as well observed by Langethal. It is more a grass for cattle-country than for sheep pasture, but wherever it is to grow the soil must be penetrable. Its turf on coast-meadows is particularly dense and of remarkable fineness. For sowing only one-sixth of the weight of the seeds, as compared with those of the Rye-Grass, is needed.

Agrostis rubra, Linné. (*A. borealis,* Hartmann.)

Northern Europe, Asia and America. A perennial grass called Red-top, and also Herd-Grass in the United States of North America. Mr. Meehan places it for its value as pasture among grasses cultivated there next after Phleum pratense and Poa pratensis (the latter there called Blue Grass), and before Dactylis glomerata (the Orchard-Grass of the United States).

Agrostis scabra, Willdenow.*

The Hair-Grass of North America. Recently recommended as one of the best lawn grasses, forming a dense turf. It will grow even on poor gravelly soil, and endure drought as well

as extreme cold. Its fine roots and suckers spread rapidly, forming soon dense matted sods (according to Dr. Channing). It starts into new growth immediately after being cut, is for its sweetness picked by pasture animals preferentially, has proved one of the best grasses for dairy ground, and suppresses weeds like Hordeum secalinum. One bushel of seed to an acre is used for pasture-land; two bushels suffice for lawns.

Agrostis Solandri, F. v. Mueller.

Extra-tropical Australia and New Zealand. Produces a large quantity of sweet fodder in damp localities (Bailey).

Agrostis vulgaris, Withering.

Europe, North Africa, Middle Asia, North America. One of the perennial grasses, which disseminate themselves with celerity, even over the worst of sandy soils. Though not a tall grass, it may be destined to contribute perhaps with Aira canescens and others largely to the grazing capabilities of desert lands; yet it will thrive also even in moist soil and Alpine regions, and is essentially a grass for sheep-country.

Ailantus glandulosa, Linné.

South East Asia. A hardy, deciduous tree, 60 feet high, of rather rapid growth and of very imposing aspect in any landscape. Particularly valuable on account of its leaves, which afford food to a silkworm (*Bombyx Cynthia*) peculiar to this tree; wood extremely durable, pale yellow, of silky lustre when planed, and therefore valued for joiners' work; it is tougher than oak or elm, easily worked, and not liable to split or warp. In South Europe planted for avenues. For this purpose prevailingly staminate trees are not eligible on account of the strong odour of the flowers. Valuable also for reclaiming coast-sands, and to this end easily propagated by suckers and fragments of roots according to Professor Sargent. The growth of the tree is quick even in poor soil, but more so in somewhat calcareous bottoms. Thrives on chalk (Vasey). Professor Meehan states that it interposes the spread of the rosebug, to which the tree is destructive.

Aira cæspitosa, Linné.

Widely dispersed over the globe. A rough fodder grass, best utilised for laying dry any moist meadows.

Albizzia bigemina, F. v. Mueller. (*Pithecolobium bigeminum*, Martius.)

India, up to Sikkim and Nepal, ascending in Ceylon to 4,000

feet. Available for our forests on account of its peculiar dark and hard wood. Another congener, A. subcoriacea (Pithecolobium subcoriaceum, Thwaites), from the mountains of India is deserving, with numerous other tall species, of cultivation.

Albizzia dulcis, F. v. Mueller. (*Pithecolobium dulce,* Bentham.)

Mexico. A valuable hedge plant. The sweet pulp of the pod is wholesome.

Albizzia Julibrissin, Durazzini.

From the Caucasus to Japan. A favourite ornamental shade-acacia in South Europe.

Albizzia latisiliqua, F. v. Mueller. (*Lysiloma latisiliqua,* Bentham.)

Tropical America. A large spreading tree; diameter of trunk to 3 feet; wood excellent for select cabinet-work, excelling, according to Nuttall, the Mahogany in its variable shining tints, which appear like watered satin; it is white, hard, and close-grained.

Albizzia Lebbek, Bentham.

The Siris Acacia of South and Middle Asia, North Africa. Available as a shade tree. It produces also a good deal of gum.

Albizzia lophantha, Benth. (*Acacia lophantha,* Willdenow.)

South-West Australia. One of the most rapidly growing trees for copses and first temporary shelter in exposed localities, but never attaining to the size of a real tree. It produces seeds abundantly, which germinate most easily. For the most desolated places, especially in desert tracts, it is of great importance to create quickly shade, shelter, and copious vegetation. Cattle browse on the leaves. The bark contains only about 8 per cent. mimosa-tannin; but Mr. Rummel found in the dry root about 10 per cent. of saponin, valuable in silk and wool factories. Saponin also occurs in Xylia dolabriformis of South Asia. In Australia found better still than the Broom-bush for shelter of new forest plantations in open sand-lands.

Albizzia Saman, F. v. Mueller. (*Pithecolobium Saman,* Bentham.)

Mexico. A lofty tree, particularly valuable for wet saline country. The pulpy pods are edible.

Albizzia stipulata, Bentham.

South Asia to the Himalayas and China. An umbrageous tree of easy culture.

Alchemilla vulgaris, Linné.

Europe, West Asia, Arctic North America, Alpine Australia. This perennial herb is important for moist dairy pastures. The same can be said of other congeners; for instance, *A. alpina L.*, from the coldest parts of Europe, North Asia, and North America; *A. Capensis* (Thunberg) and *A. elongata* (Ecklon and Zeyher) of South Africa, some Abyssinian species, as well as *A. pinnata* (Ruiz and Pavon) and other congeners of the Andes.

Aletris farinosa, Linné.

The Colic Root of the woodlands of North America. This pretty herb is of extreme bitterness, and can be medicinally administered as a tonic.

Aleurites cordata, R. Brown.

From Japan to Nepal, also in Bourbon. This tree for its beauty and durable wood deserves cultivation in our plantations in humid districts. The oil of the seeds serves as varnish. Perhaps, in localities free of frost, it would be of sufficiently quick growth.

Aleurites triloba, R. and G. Forster.

The Candlenut Tree, a native of the tropics of both hemispheres, which furnishes a valuable dye from its fruits, and copious oil from its seeds. I found the tree barely able to endure the winters of Melbourne.

Alibertia edulis, A. Richard.

Guiana and Brazil, southward to extra-tropic latitudes, widely dispersed through the drier regions. The fruit of this shrub is edible and known as "Marmeladinha." *A. Melloana* (J. Hooker), of South Brazil, seems to serve the same purpose.

Alkanna tinctoria, Tausch.

On sandy places around the Mediterranean Sea. It yields the Alkanna root used for dyeing oleaginous and other substances. It might be naturalised. Can be grown in almost pure sand.

Allium Canadense, Kalm.

North American Garlic. Could be cultivated or naturalised on moist meadows for the sake of its top bulbs, which are much sought for pickles of superior flavour.

Allium roseum, Linné.

Countries on the Mediterranean Sea. This, with Allium

Neapolitanum (Cyrillo), one of its companions, yields edible roots, according to Heldreich.

Allium Schœnoprasum, Linné.

The Chives. Europe, Northern Asia, and North America. Available for salads and condiments. This species of Allium seems not yet so generally adopted in our culinary cultivation as Allium Ascalonicum (the Shallot), A. Cepa (the ordinary Onion), A. fistulosum (the Welsh Onion), A. Porrum (the Leek), and A. sativum (the Garlic). A. Scorodoprasum, or the Sand Leek of Europe and North Africa, resembles both Garlic and Shallot. A. Ampeloprasum is the British Leek, which extends over Middle and South Europe and West Asia, called in culture the Summer Leek, a variety of which is the Early Pearl Leek.

Alnus glutinosa, Gaertner.

The ordinary Alder. Throughout Europe and extra-tropical Asia, up to 70 feet high; well adapted for river banks, recommended by Wessely for wet valleys in coast-sand; wood soft and light, turning red, furnishing one of the best charcoals for gunpowder; it is also durable under water, and adapted for turners' and joiners' work. The wood is also well suited for pump-trees and other underground work, as it will harden almost like stone. The tree is valuable for the utilisation of bog-land. A. incana (Willd.) extends to North America; it is of smaller size. The bark of several Alders is of great medicinal value, and a decoction will give to cloth saturated with lye an indelible orange colour (Porcher); it contains a peculiar tannic principle. American Alder extract has come into use for tanning; it renders skins particularly firm, mellow, and well coloured (Eaton). The bark contains 36 per cent. tannin (Muspratt). A. Oregana, Nuttall, of California and Oregon, rises to a height of 80 feet.

Alnus nepalensis, D. Don.

Himalayas, between 3,000 and 9,000 feet. Reaches a height of 60 feet. With another Himalayan Alder, A. nitida (Endlicher), it can be grown along streams for the sake of its wood.

Aloe dichotoma, Linné, fil.

Damara and Namaqua-land. This species attains a height of 30 feet, and expands occasionally with its branches so far as to give a circumference of 40 feet. The stem is remarkably

smooth, with a girth sometimes of 12 feet. It is a yellow flowering species. A. Bainesii (Baker & Dyer) is almost as gigantic as the foregoing. Both doubtless yield medical gum-resin like many others. A. Barberæ, which is closely related to A. Zeyheri, attains in Caffraria a height of 40 feet, with a stem 16 feet in circumference at 3 feet from the ground.

Aloe ferox, Miller.

South Africa. This species yields the best Cape Aloe, as observed by Dr. Pappe. The simply inspissated juice of the leaves of the various species of this genus constitutes the Aloe drug. It is best obtained by using neither heat nor pressure for extracting the sap. By re-dissolving the aqueous part in cold water, and reducing the liquid through boiling to dryness the extract of aloes is prepared. All species are highly valuable, and can be used, irrespective of their medicinal importance, to beautify any rocky or otherwise arid spot.

Aloe linguiformis, Miller.

South Africa. According to Thunberg, from this species the purest gum-resin is obtained.

Aloe plicatilis, Miller.

South Africa. The drug of this species acts milder than that of A. ferox.

Aloe purpurascens, Haworth.

South Africa. Another of the plants which furnish the Cape aloe of commerce. The South African Aloe arborescens (Miller) and A. Commelyni (Willdenow) are also drawn into use for aloe, according to Baillon, Saunders, and Hanbury.

Aloe socotrina, Lamarck. (*A. vera*, Linné.)

Hills of the Island of Socotra. Extending as a native plant along the Red Sea and the shores of India. Also cultivated in Barbadoes and elsewhere, thus yielding the Socotrin aloe and Moka aloe.

Aloe spicata, Thunberg.

South Africa. This also provides Cape aloe. It is an exceedingly handsome plant.

Aloe vulgaris, Lamarck.

The Yellow-flowered Aloe. Countries around the Mediterranean Sea, also Canary Islands, on the sandy or rocky sea-

coast. Such places could also here readily be utilised for this and allied plants. Dr. Sibthorp identified this species with the Αλόη of Dioscorides; hence it is not probable that A. vulgaris is simultaneously also of American origin, although it is cultivated in the Antilles, and furnishes from thence the main supply of the Barbadoes aloe. In East India this species also seemingly only exists in a cultivated state. Haworth found the leaves of this and of A. striata softer and more succulent than those of any other aloe. It is said to be the only species with yellow flowers among those early known. It is also this species only which Professor Willkomm and Professor Parlatore record as truly wild in Spain and Italy.

Aloe Zeyheri, Harvey.

South Africa. A magnificent, very tall species; doubtless valuable like the rest.

Aloexylon Agallochum, Loureiro.

Cochin-China, on the highest mountains. The precious aloe wood, so famed for its balsamic fragrance and medicinal properties, is derived from this tree.

Alopecurus bulbosus, Linné.

Middle and South Europe. An important grass for salt marshes.

Alopecurus geniculatus, Linné.

Europe, Asia, North Africa. A good fodder-grass for swampy ground; easily naturalised.

Alopecurus pratensis, Linné.*

Meadow Foxtail-Grass. Europe, North Africa, North and Middle Asia. One of the best of perennial pasture-grasses. It attains to its full perfection only after a few years of growth, as noticed by Sinclair. For this reason it is not equal to Dactylis glomerata for the purpose of changing crops. Otherwise it is more nutritious than the latter, although the annual return in Britain proved less. Sheep thrive well on it. Sinclair and others found that this grass, when exclusively combined with white clover, will support from the second season five ewes and five lambs on an acre of sandy loam. But this grass, to thrive well, needs land not altogether dry. In all permanent artificial pastures this Alopecurus should form one of the principal ingredients, because it is so lasting and so nutritive. In our Alpine regions it would also prove prolific, and might

convert many places there gradually into summer pastures. It is early flowering, and likes the presence of lime in the soil.

Alstonia constricta, F. v. Mueller.

Warmer parts of East Australia, particularly in the dry inland districts. The bark of this small tree is aromatic bitter, and regarded as valuable in ague, also as a general tonic. It is allied to the Dita bark of India and North-Eastern Australia from Alstonia scholaris, R. Brown, and produces a peculiar alkaloid, alstonin (Baron von Mueller and L. Rummel). See Wittstein's Organic Constituents of Plants (edit. Muell. 1878, p. 330).

Alstrœmeria pallida, Graham.

Chili. Palatable starch can be obtained from the root of this plant, which, for its loveliness alone, deserves a place in any garden. The tubers of others of the numerous Alstrœmerias can doubtless be utilised in a similar technic manner.

Althæa officinalis, Linné.

The Real Marsh-Mallow. Europe, North Africa, North and Middle Asia. A tall perennial herb, with handsome flowers. The mucilaginous root and also the foliage are used for medicinal purposes. The plant succeeds best on damp, somewhat saline soil.

Amarantus Blitum, Linné.

South Europe, North Africa, South-West Asia. This annual herb is a favourite plant among allied ones for spinage; but not only species of this genus, but also many other Amarantaceæ serve as culinary herbs. The dried plant contains 10 to 12 per cent. nitrate of potash. It arrives at maturity in two to three months, producing on good soil about 4 tons per acre, equal to about 400 lbs. saltpetre. A. cruentus L., A. hypochondriacus L., and A. caudatus L., are cultivated in Ceylon. A. frumentaceus, Hamilt., is closely allied to the first one mentioned, and attains 6 feet on slopes of mountains, when cultivated in South India for food-grain. The leaves serve as a vegetable.

Amarantus paniculatus, Linné.

In tropical countries of Asia and also America. An annual herb, yielding half a pound of floury nutritious seeds on a square yard of ground in three months, according to Roxburgh. Extensively cultivated in India.

Amelanchier Botryapium, Candolle.

The Grape-Pear of North America. This handsome fruit tree attains a height of 30 feet. The purplish or almost black fruits are small, but of pleasant subacid taste, and ripen early in the season. It bears abundantly, so much so that Mr. Adams of Ohio calculated the yield at 300 bushels per acre annually, if the variety oblongifolia is chosen. It is the Dwarf June-berry of North America. This bush or tree will live in sandsoil; but it is one of those hardy kinds particularly eligible for our Alps.

Amyris terebinthifolia, Tenore.

Brazil. Is perfectly hardy in Victoria and is content in dry ground without any irrigation. It proved one of the best among the smaller avenue trees, is beautifully spreading and umbrageous, and probably of medicinal value.

Anacyclus Pyrethrum, Candolle.

Countries near the Mediterranean Sea. The root of this perennial herb is used medicinally.

Andropogon argenteus, Candolle.

Pronounced by Leybold to be one of the best fodder-grasses of the Cordilleras of Chili.

Andropogon australis, Sprengel. (*Sorghum plumosum,* Beauvois.)

Tropical and also eastern extra-tropic Australia as far south as Gippsland. Brought under notice by Mr. Ch. Moore as an admirable perennial pasture-grass. The allied A. tropicus, Sprengel (Sorghum fulvum, Beauv.), of tropical Australia, South Asia, China, and Japan, serves similar purposes.

Andropogon avenaceus, Michaux. (*Sorghum avenaceum,* Willd.)

North and Central America. This tall perennial grass lives in dry, sandy soil, and should here be tried for growth of fodder.

Andropogon bicolor, Roxburgh.

Warmer parts of Asia. One of the annual tall Sorghums. It ripens its seeds in three or four months from the time of sowing, the produce in good soil being often upwards of one hundredfold. It is a wholesome grain.

Andropogon Calamus, Royle.

Central India. The Sweet Calamus of the Ancients. From

this species the Gingergrass Oil of Nemaur is distilled, an article much used in perfumery.

Andropogon cernuus, Roxburgh.* (*Sorghum cernuum,* Willd.)

One of the Guinea-Corns. India, where it is much cultivated, and so also in other tropical countries. It is perennial, and forms the "staff of life" of the mountaineers beyond Bengal. It reaches a height of 15 feet, with leaves over 3 feet long. The thick stems are rooting at the lower joints, and cattle are very fond of them. The grain is white. The specific limits of the various Sorghums are not well ascertained.

Andropogon citratus, Candolle.

The Lemon Grass of India. It yields an essential oil for perfumery; besides it is occasionally used for tea. This applies as well to Andropogon Nardus, L., and some allied grasses.

Andropogon erianthoides, F. v. Mueller.

Eastern Sub-tropical Australia. Mr. Bailey observes of this perennial grass that "it would be difficult to find a grass superior for fodder to this; it produces a heavy crop of rich, sweet, succulent herbage; it spreads freely from roots and seeds, and shoots again when fed down."

Andropogon falcatus, Steudel.

India and Queensland. Considered by Mr. Bailey a good lawn-grass, of dwarf, compact growth, and of bright verdure.

Andropogon Gryllos, Linné.

In the warm, temperate, and the hot zone of the eastern hemisphere. A useful fodder-grass (Bailey).

Andropogon Haleppensis, Sibthorp.

South Europe, warmer parts of Asia and North Africa. Praised already by Theophrastos more than 2,000 years ago. Not easily repressed in wet ground. A rich perennial grass, cultivated often under the name of Cuba Grass. It yields a large hay crop, as it may be cut half a dozen times in a season, should the land be rich. All kinds of stock have a predilection for this grass. It will mat the soil with its deep and spreading roots; hence it should be kept from cultivated fields. In Victoria hardy up to 2,000 feet elevation.

Andropogon Ivarancusa, Roxburgh.

One of the fragrant grasses of North India, much used like A. Schœnanthus.

Andropogon Martini, Roxburgh. (*A. flexuosus,* Nees.)

Tropical Asia and Australia. The fragant Citronella Oil is distilled in Ceylon and elsewhere from the leaves of this species. General Martin observed that cattle are voraciously fond of this grass; but it imparts its fragrance to meat and milk. Regarded by Munro a variety of A. Schoenanthas.

Andropogon muricatus, Retzius.

India. A swamp-grass, with delightfully fragrant roots. According to Dr. G. King, the fragrant Indian mats are made of this grass.

Andropogon nutans, Linné. (*Sorghum nutans,* Gray.)

North America. A tall, nutritious, perennial grass, content with dry and barren soil.

Andropogon pertusus, Willdenow.

South Asia, Tropical and Sub-tropical Australia. Perennial. Mr. Nixon, of Benalla, regards it as one of the best grasses to withstand long droughts, while it will bear any amount of feeding. It endures cold better than some other Andropogons of Queensland, according to Mr. Bailey's observations.

Andropogon refractus, R. Brown.

North and East Australia, Polynesia. Mr. Bailey observes of this perennial grass, that it is equally excellent for pastures and hay, and that it produces a heavy crop during summer; the root is fragrant.

Andropogon saccharatus, Roxburgh.* (*Sorghum saccharatum,* Pers.)

Tropical Asia. The Broom Corn. A tall annual species, splendid as a fodder-grass. Produces of all grasses, except the Teosinté, the heaviest fodder-crop in warm climes. From the saccharine juice sugar is obtainable. A sample of such, prepared from plants of the Melbourne Botanic Garden, was shown at the Exhibition of 1862. This Sorghum furnishes also material for a well-known kind of brooms. A variety or a closely allied species yields the Caffir Corn (A. Caffrorum, Kunth). The plant can be advantageously utilised for preparing treacle. For this purpose the sap is expressed at the time of flowering, and simply evaporated; the yield is about 100 gallons from the acre. In 1860 nearly seven millions of gallons of sorghum treacle were produced in the United States. The stem can be used as a culinary vegetable.

Andropogon schœnanthus, Linné.

South Asia and Tropical Australia. A scented grass, allied to the Indian oil-yielding Andropogons. The medicinal Siri oil is prepared from the root. A similar species occurs in arid places of the interior of North Australia.

Andropogon sericeus, R. Brown.

Hotter regions of Australia, even in desert tracts, also extending to New Caledonia and the Philippine Islands. A fattening perennial pasture-grass, worthy of praise.

Andropogon Sorghum, Brotero.* (*Sorghum vulgare,* Persoon.)

The large Indian Millet or Guinea-Corn, or the Durra. Warmer parts of Asia. A tall annual plant. The grains can be converted into bread, porridge, and other preparations of food. It is a very prolific corn—Sir John Hearsay counted 12,700 seeds on one plant—and particularly valuable for green fodder. The panicles are used for carpet-brooms, the fibrous roots for velvet-brushes. A kind of beer called "Merisa" is prepared from the seed. Many others of the numerous species of Andropogon, from both hemispheres, deserve our attention.

Anemone Pulsatilla, Linné.

Europe and Northern Asia. On limestone soil. This pretty perennial herb is of some medicinal importance.

Angophora intermedia, Candolle.

South-East Australia. This is one of the best of the Angophoras, attaining a height of 50 feet, and growing with the rapidity of a Eucalyptus, but being more close and shady in its foliage. It would be one of our best trees to line public roads and to effect shelter-plantations.

Angophora subvelutina, F. v. Mueller.

Queensland and New South Wales. The tallest of the species; attains a height of 100 feet. The wood is light and tough, soft while green, very hard when dry, used for wheel-naves, bullock-yokes, handles, &c.; it burns well and contains a large proportion of potash (Hartmann). According to Messrs. Bailey and Kirton, as much as two gallons of liquid kino can sometimes be obtained from a single tree of Angophora lanceolata.

Anona Cherimolia, Miller.

Tropical and Sub-tropical South America. This shrub or tree

might be tried in the frostless forest-valleys, where humidity and rich soil will prove favourable to its growth. It yields the Cherimoyer fruit. The flowers are very fragrant.

Anthemis nobilis, Linné.

The true Camomile. Middle and South Europe, North Africa. A well-known medicinal plant, frequently used as edgings for garden plots. Flowers in their normal state are preferable for medicinal use to those in which the ray flowers are produced in increased numbers. They contain a peculiar volatile oil and two acids similar to angelic and valerianic acid.

Anthemis tinctoria, Linné.

Middle and South Europe, Orient. An annual herb. The flowers contain a yellow dye.

Anthistiria avenacea, F. v. Mueller.

New South Wales and Queensland. A nutritious, perennial pasture-grass. Called by Mr. Bailey "one of the most productive grasses of Australia;" it produces a large amount of bottom-fodder, but it has also the advantage of being a prolific seeder.

Anthistiria ciliata, Linné, fil. (*Anthistiria Australis,* R. Brown.)

The well-known Kangaroo Grass, not confined to Australia, but stretching through Southern Asia also, and through the whole of Africa. It is mentioned here, because its growth should be encouraged by every means. There are several species of Anthistiria deserving introduction and naturalisation in warm, temperate or tropic climes.

Anthoxanthum odoratum, Linné.

The scented Vernal Grass. Europe, North and Middle Asia, North Africa. Perennial, and not of great value as a fattening grass, yet always desired for the flavour which it imparts to hay. Perhaps for this purpose the scented Andropogons might serve here also. On deep and moist soils it attains its greatest perfection. It is much used for mixing among permanent grasses on pastures, where it will continue long in season. It would live well in our Alps. The lamellar crystaline Cumarin is the principle on which the odour of Anthoxanthum depends.

Anthriscus Cerefolium, Hoffmann.

Europe and West Asia. The Chervil. An annual culinary

plant, its herbage used as an aromatic condiment, bnt the orot seemingly deleterious.

Anthyllis vulneraria, Linné.

The Kidney Vetch. All Europe, North Africa, West Asia. This perennial herb serves as sheep fodder, and is particularly recommended for calcareous soils. It would also live on our Alps.

Apios tuberosa, Moench.

North America. A climber, with somewhat milky juice. The mealy tubers are edible.

Apium graveolens, Linné.

The Celery. Europe, North Africa, North and Middle Asia. It is here merely inserted with a view of pointing out that, it might be readily naturalised on our sea-shores.

Apium prostratum, La Billardière.

The Australian Celery. Extra-tropical Australia, New Zealand, Extra-tropical South America. This also can be utilised as a culinary vegetable.

Apocynum cannabinum, Linné.

On river-banks in North America. A perennial herb. This is recorded among plants yielding a textile fibre.

Aponogeton crispus, Thunberg.

From India to New South Wales. The tuberous roots of this water-herb are amylaceous and of excellent taste, though not large. The same remarks apply to A. monostachyus, Linné, fil.

Aponogeton distachyos, Thunberg.

South Africa. This curious water-plant might be naturalised in our ditches, swamps, and lakes, for the sake of its edible tubers. The scented flowering portion affords spinage.

Aquilaria Agallocha, Roxburgh.

On the mountains of Silhet and Assam. A tree of immense size. It furnishes the fragrant calambac or agallochum-wood, known also as aggur or tuggur or the aloe-wood of commerce, famed since ancient times. The odorous portion is only partially distributed through the stem. This wood is also of medicinal value.

Arachis hypogæa, Linné.*

The Earth-Nut, Pea-Nut, or Ground-Nut. Brazil. The seeds of this annual herb are consumed in a roasted state, or used for pressing from them a palatable oil. The plant is a very productive one, and yields a very quick return. It ranks also as a valuable fodder-herb; the hay is very nutritious, much increasing the milk of cows. A light somewhat calcareous soil is best fitted for its growth. On such soil 50 bushels may be obtained from the acre.

Aralia cordata, Thunberg.

China. The young shoots provide an excellent culinary vegetable.

Araucaria Bidwilli, Hooker.*

Bunya-Bunya. Southern Queensland. A tree 150 feet in height, with a fine-grained, hard, and durable wood, particularly valuable for furniture; it shows its beautiful veins best when polished. The seeds are large and edible. Mr. Hartmann observed trees 250 feet high.

Araucaria Brasiliensis, A. Richard.*

Brazilian Pine. South Brazil. A tree 180 feet high, producing edible seeds. Dr. Saldanhada Gama reports that it makes splendid boards, masts and spars, and that the sap yields a good deal of turpentine. Except a few palms (Mauritia, Attalea, Copernicia) this seems the only tree which in Tropical South America forms forests by itself (Martius).

Araucaria Cookii, R. Brown.

In New Caledonia, where it forms large forests. Height of tree 200 feet.

Araucaria Cunninghami, Aiton.

Moreton Bay Pine. East Australia, between 14° and 32° south latitude extending also to New Guinea, according to Dr. Beccari. The tree attains a height of 200 feet and a stem 6 feet in diameter. The timber is fine-grained, strong, and durable, if not exposed to alternately dry and wet influences; it is susceptible of a high polish, and thus competes with satin wood and birds-eye maple (Queensland Exhibition, 1877). Value in Brisbane £2-15 to £3-10 per 1,000 superficial feet.

Araucaria excelsa, R. Brown.

Norfolk Island Pine. A magnificent tree, sometimes 220 feet

high, with a stem attaining 10 feet in diameter. The timber is useful for ship-building and many other purposes.

Araucaria imbricata, Pavon.*

Chili and Patagonia. The male tree attains only a height of 50 feet, but the female reaches 150 feet. It furnishes a hard and durable timber, as well as an abundance of edible seeds, which constitute a main article of food of the natives. Eighteen good trees will yield enough for a man's sustenance all the year round. The wood is yellowish white, full of beautiful veins, and capable of being polished and worked with facility. It is admirably adapted for ship-building. The resin is pale and smells like frankincense (Lawson).

Araucaria Rulei, F. v. Mueller.

New Caledonia. A magnificent tree with large shining foliage, doubtless not merely of decorative, but also of utilitarian value. A closely-allied species, A. Muelleri (Brogniart), comes with A. Balansæ and A. montana from the same island. The New Guinea Araucarias should also be introduced.

Arbutus Menziesii, Pursh.

North-West America. An evergreen tree, attaining a height of 150 feet. It belongs to the coast tract exclusively. Wood exceedingly hard. The tree requires a deep loamy soil (Bolander); it would here be valuable at least as a highly ornamental garden plant.

Archangelica officinalis, Hoffmann.

Arctic zone and mountain regions of Europe. The stalks are used for confectionery; the roots are of medicinal use. Only in our Alps would this herb fully establish its value. The root is biennial and used in the distillation of some cordials.

Arctostaphylos uva ursi, Sprengel.

Alpine and Arctic Europe, North Asia and North America. A medicinal small shrub, which here could best be reared in the heath-moors of Alpine regions.

Arenga saccharifera, La Billardière.

India. This Palm attains a height of 40 feet. The black fibres of the leaf-stalks adapted for cables and ropes intended to resist wet very long. The juice converted into toddy or sugar; the young kernels made with syrup into preserves. This Palm dies as soon as it has produced its fruit; the stem

then becomes hollow and is used for spouts and troughs of great durability. The pith supplies sago, about 150 lbs. from a tree, according to Roxburgh. An Arenga occurs as far south as Japan.

Argania sideroxylon, Roemer and Schultes.

The Argan Tree. Western Barbary, on dry hills. Its growth is generally slow; but it is a tree of longevity. Though comparatively low in stature, its foliage occasionally spreads to a circumference of 220 feet. It sends out suckers from the root. The fruits serve as food for cattle in Morocco; but here the kernels would be more likely to be utilised by pressing an oil from them. Height of tree exceptionally 70 feet.

Aristida prodigiosa, Welwitsch.*

Angola, on the driest sand-hills. A perennial fodder-grass, of which the discoverer speaks in glowing terms of praise. In the West African desert country, in places bare of almost all other vegetation, zebras, antelopes and hares resort with avidity to this grass; it affords in the dry season there, also, almost the only fodder for domestic grazing animals. Moreover, this seems to indicate that the closely cognate *A. plumosa*, L., and *A. ciliata*, Desf., of the countries at or near the Mediterranean Sea, might likewise be encouraged in their natural or for cultural growth. All feathery grasses are, besides, among the most lovely for minor decorative purposes or designs, and this may also be said of the Australian plumous *Stipa elegantissima*, La Billardière.

Aristolochia Indica, Linné.

Tropical Asia and Polynesia. A perennial climber; the leaves famed as an alexipharmic. Can only be grown in places free from frost.

Aristolochia recurvilabra, Hance.

The green Putchuck of China. A medicinal plant, largely obtained at Ningpo. The present value of its export is from £20,000 to 30,000 annually.

Aristolochia serpentaria, Linné.

The Snake-Root of North America. The root of this trailing herb is valuable in medicine; it contains a peculiar volatile oil. Several other Aristolochiæ deserve culture for medicinal purposes,—for instance, Aristolochia ovalifolia (the Guaco) and A. anguicida, from the mountains of Central America.

Aristotelia Macqui, L'Heritier.

Chili. The berries of this shrub, though small, have the pleasant taste of bilberries, and are largely consumed in Chili. The plant would thrive in our forest valleys.

Arnica montana, Linné.

Colder parts of Europe. This pretty herb is perennial, and of medicinal value. It is eligible for our sub-alpine regions. The active principles are: arnicin, volatile oil, caproic and caprylic acid.

Arracacha xanthorrhiza, Bancroft.

Mountain regions of Central America. An umbelliferous herb. The roots are nutritious and palatable. There are yellow, purple and pale varieties.

Artemisia Absinthium, Linné.

The Wormwood. Europe, North and Middle Asia, and North Africa. A perennial herb, valuable as a tonic and anthelminthic. Several other species of Artemisia deserve cultivation for medicinal purposes. Active principles: Absinthin, an oily substance indurating to a crystalline mass, a volatile oil peculiar to the species.

Artemisia Cina, Berg.

Kurdistan. This herb furnishes the genuine Santonica seeds (or rather flowers and fruits) as a vermifuge of long-established use. Some other Asiatic species yield a similar drug.

Artemisia Dracunculus, Linné.

The Tarragon or Estragon. North Asia. A perennial herb, used as a condiment. Its flavour rests on two volatile oils, one of them peculiar to the plant.

Artemisia Mutellina, Villars.

Alps of Europe. This aromatic, somewhat woody plant deserves to be established in our snowy regions.

Artemisia Pontica, Linné.

Middle and South Europe, West Asia. More aromatic and less bitter than the ordinary wormwood. Many other species of this genus deserve attention of the culturist.

Artocarpus incisa, G. Forster.*

The Tahiti Bread-Fruit Tree. It stretches in the Sandwich island through cultivation almost beyond the tropics. The oldest name of this well-known and remarkable tree is that given in 1776 by R. & G. Forster, *viz.*, A. communis. According to Dr. Seemann's excellent account seedless varieties exist and others with entire leaves and smooth and variously shaped and sized fruits, others again ripening earlier, others later, so that ripe bread-fruit is obtainable more or less abundantly throughout the year. The fruit is simply boiled or baked or converted into more complicated kinds of food. The very fibrous bark can be beaten into a sort of rough cloth. The light would serve for canoes. The exudation issuing from cuts made into the stem is in use for closing the seams of canoes.

Artocarpus integrifolia, Linné.

India. The famous Jack-Tree, ascending like the allied A. Lakoocha (Roxburgh) to 4,000 feet.

Arundinaria falcata, Nees.

The Ringal or Ningala Bamboo of the Himalayas, at elevations from 3,500 to 10,000 feet, forming close and dense thickets. Foliage pale green. It rises to the height of 40 feet; the canes durable, attaining a diameter of only 4 inches, applied to manifold useful purposes. This bamboo does not necessarily require moisture. It is as hardy as the Pampas Grass and can be propagated even in an English clime in the open air from cuttings. In reference to various bamboos refer to the Gardener's Chronicle of December 1876, also the Bulletin de la Société d'Acclimation de Paris, 1878. The closely allied Jurboota Bamboo of Nepal, which occurs only in the cold altitudes of from 7,000 to 10,000 feet, differs in solitary stems, not growing in clumps. The Tham or Kaptur Bamboo is from a still colder zone, at from 8,500 to 11,500 feet, only 500 feet or less below the inferior limits of perpetual glaciers (Major Madden).

Arundinaria Japonica, Siebold and Zuccarini.

Japan, attains a height of from 6 to 12 feet. Hardy in the south of England (Dr. Shapter).

Arundinaria macrosperma, Michaux.

Southern States of North America, particularly on the Mississippi. This bamboo-like reed forms there the canebrakes. It

requires to be replanted after flowering in the course of years. Height, 20 feet.

Arundo Ampelodesmos, Cyrillo.

South Europe, North Africa. Almost as large as a Gynerium. The tough flower-stems and leaves readily available for tying.

Arundo Bengalensis, Roxburgh.

China, India. Closely allied to *A. Donax*. The long panicle beautifully variegated white and violet (Hance).

Arundo conspicua, G. Forster.

New Zealand and Chatham Islands. Although not strictly an industrial plant, it is mentioned here as important for scenic effect, flowering before the still grander A. Sellowiana comes in bloom.

Arundo Donax, Linné.

The tall evergreen lasting Bamboo Reed of South Europe and North Africa. It is one of the most important plants of its class for quickly producing a peculiar scenic effect in picturesque plantations, also for intercepting at once the view to unsightly objects, and for giving early shelter. The canes can be used for fishing-rods.

Arundo Karka, Roxburgh.

India, China, Japan. The Durma mats are made of the split stems of this tall reed.

Arundo Pliniana, Turra.

On the Mediterranean and Adriatic Seas. A smaller plant than A. Donax, with more slender stems and narrower leaves, but similarly evergreen, and resembling the Donax Reed also in its roots.

Arundo saccharoides, Grisebach. (*Gynerium saccharoides,* Humboldt.)

Northern parts of South America. 20 feet high. Like the following, it is conspicuously magnificent.

Arundo Sellowiana, Schultes. (*Arundo dioica,* Sprengel *non* Loureiro. *Gynerium argenteum,* Nees.)

The Pampas Grass of Uruguay, Paraguay, and the La Plata State. A grand autumnal-flowering reed, with gorgeous

feathery panicles. As an industrial plant it deserves here a place, because paper can be prepared from its leaves.

Asparagus acutifolius, Linné.

In all the countries arround the Mediterranean Sea, also in the Canary Islands. Although a shrubby Asparagus, yet the root-shoots, according to Dr. Heldreich, are collected in Greece, and are tender and of excellent taste, though somewhat thinner than those of the ordinary herbaceous species. The shrub grows on stony rises, and the shoots are obtained without cultivation. A. aphyllus L., and A. horridus L., according to Dr. Reinhold, are utilised in the same manner, and all may probably yield an improved produce by regular and careful culture.

Asparagus albus, Linné.

Countries around the Mediterranean Sea and Canary Islands. Serves for garden hedges.

Asparagus laricinus, Burchell.

South Africa. Dr. Pappe observes of this shrubby species, that with some other kinds of that country it produces shoots of excellent tenderness and aromatic taste.

Asparagus officinalis, Linné.

Europe, North Africa, North Asia. The well-known Asparagus plant, which, if naturalised on our coast, would aid in binding the sand. The foliage contains inosit-sugar; the shoots yield asparagin. Sea-weeds are a good additional material for forcing asparagus.

Asperula odorata, Linné.

The Woodruff. Europe, North Africa, West and North Asia. A perennial herb with highly fragrant flowers; it deserves naturalisation in forests, containing much cumarin in its flowers, and serving in Germany for preparing the "maitrank."

Aspidosperma Quebracho, Grisebach.

Argentina. Shrub or tree, even tall, with a wood fit for xylography. The bitter bark is tannic and febrifugal (Lorentz). The bark is almost as rich as that of Acacia Cebil. The leaves contain even 27½ per cent.; both have the advantage of producing an almost colourless leather (Sievert). F. Jean states that even the Quebracho-wood contains 14 to 16 per cent. of tannic and 2 to 3 per cent. of gallic acid.

Astragalus arenarius, Linné.

Europe and Western Asia. A perennial fodder-herb for any sandy desert country. The species, numerous in various parts of Europe and Asia, in California and some other parts of the globe, deserve attention for pasture and other agronomic purposes.

Astragalus cephalonicus, Fischer. (*A. aristatus*, Sibthorp.)

Cephalonia. A small shrub, yielding a good tragacanth; and so probably also the true A. aristatus of l'Heritier is producing it.

Astragalus Cicer, Linné.

Middle and South Europe and Middle Asia. A nutritious and tasty perennial herb, much sought by grazing animals. It requires, according to Langethal, deep friable grounds and, like most leguminous herbs, calcareous ingredients in the soil.

Astragalus Creticus, Lamarck.

Candia and Greece. A small bush, exuding the ordinary vermicular tragacanth. The pale is preferable to the brown sort.

Astragalus glycyphyllos, Linné.

Europe and North Asia. Succeeds on light soil, also in forest regions. It has been recommended as a perennial substantial fodder-plant.

Astragalus gummifer, La Billardière.

Syria and Persia. This shrub also yields a good kind of tragacanth.

Astragalus hypoglottis, Linné.

In the colder regions of Europe, Asia and North America. This perennial plant is regarded as a good fodder-herb on calcareous and gravelly soil, and would likely be of importance for our Alps. Of the enormous number of supposed species of this genus (according to Boissier, not less that 750 merely in Asia Minor and the adjoining countries) many must be of value for pasture, like some of the closely-allied Australian Swainsonas, though they also may include deleterious species. A. Hornii and A. lentiginosus, A. Gray, are poisonous to cattle in California.

Astragalus Parnassi, Boissier. (*A. Cylleneus,* Heldreich.)

Greece. This small shrub furnishes there almost exclusively the commercial Tragacanth. It ascends to elevations of 7,000 feet, becomes therefore alpine.

Astragalus strabiliferus, Royle.

Asiatic Turkey. The brown tragacanth is collected from this species.

Astragalus venosus, Hochstetter.

From Abyssinia to Central Africa. This perennial herb is subjected to regular cultivation for fodder known as "Hamat Kochata" (Oliver).

Astragalus verus, Olivier.

Asiatic Turkey and Persia. This shrub furnishes the Takalor or Smyrna Tragacanth, or it is derived from an allied species.

Astrebla pectinata, F. v. Mueller.* (*Danthonia pectinata,* Lindley.)

New South Wales, Queensland, North and Central Australia, in arid regions, always inland. A perennial desert grass, resisting drought, sought with avidity by sheep and very fattening to them and other pasture animals.

Astrebla triticoides, F. v. Mueller.* (*Danthonia triticoides,* Lindley.)

The Mitchell Grass. Of nearly the same natural distribution as the preceding, and equalling that species in value. Both so important as to deserve rearing even in their native country.

Atalantia glauca, J. Hooker.

New South Wales and Queensland. This Desert Lemon is mentioned here to draw attention to the likelihood of its improving in culture, and to its fitness for being grown in arid land.

Atriplex crystallinum, J. Hooker.

South-East Australia and Tasmania on the coast. This herb vegetates solely in salty coast-sands, which, like Cakile, it helps to bind, on the brink of the ocean and exposed to its spray.

Atriplex halimoides, Lindley.*

Over the greater part of the saline desert-interior of Australia, reaching the south and west coasts. A dwarf bush, with its frequent companion, A. holocarpum, among the very best for salt-bush pasture.

Atriplex hortensis, Linné.

North and Middle Asia. The Arroche. An annual spinach-plant.

Atriplex nummularium, Lindley.

From Queensland through the desert tracts to Victoria and South Australia. One of the tallest and most fattening and wholesome of Australian pastoral salt-bushes, also highly recommendable for artificial rearing, as the spontaneously-growing plants, by close occupation of the sheep and cattle runs, have largely disappeared, and as this useful bush even in many wide tracts of Australia does not exist.

Atriplex spongiosum, F. v. Mueller.

Through a great part of Central Australia, extending to the west coast. Available like the preceding and several other native species for salt-bush culture. Unquestionably some of the shrubby extra-Australian species, particularly those of the Siberian and Californian steppes, could also be transferred advantageously to salt-bush country elsewhere, to increase its value, particularly for sheep pasture.

Atriplex vesicarium, Heward.*

In the interior of South-Eastern Australia and also in Central Australia. Perhaps the most fattening and most relished of all the dwarf pastoral salt-bushes of Australia, holding out in the utmost extremes of drought, and not scorched even by sirocco-like blazes. Its vast abundance over extensive salt-bush plains of the Australian interior, to the exclusion of almost every other bush except A. halimoides, indicates the facility with which this species disseminates itself.

Atropa Belladonna, Linné.

The Deadly Nightshade. South and Middle Europe and Western Asia. A most important perennial medicinal herb. The highly powerful atropin is derived from it, besides another alkaloid, the belladonnin.

Avena elatior, Linné.

Europe, Middle Asia, North Africa. This tall grass should not be passed altogether on this occasion, although it becomes easily irrepressible on account of its wide-creeping roots. It should here be chosen for dry and barren tracts of country, it having proved to resist occasional droughts even better than Rye-Grass. The bulk yielded by it is great; it submits well

to depasturing, and gives two or three crops of hay annually; it is, however, not so much relished by animals as many other grasses.

Avena fatua, Linné.

Wild Oat. Europe, North Africa, North and Middle Asia, eastward as far as Japan. The experiments of Professor Buckman indicate that our ordinary Culture Oat (Avena sativa, L.) is descended from this plant.

Avena flavescens, Linné. (*Trisetum flavescens,* Beauv.)

Yellowish Oat-Grass. Europe, North Africa, Middle and North Asia, eastward as far as Japan. One of the best of perennial meadow-grasses, living on dry soil; fitted also for our Alps. Lawson observes that it yields a considerable bulk of fine foliage, and that it is eagerly sought by sheep, but that it thrives best intermixed with other grasses. It likes particularly limestone soil, where it forms a most valuable undergrass, but is not adapted for poor sand, nor will it stand well the traversing of grazing animals (Langethal).

Avena pratensis, Linné.

Meadow Oat-Grass. Europe, North Asia. It thrives well on dry, clayey soil; it produces a sweet fodder, but not in so great a proportion as several other less nutritious grasses. It is perennial, and well adapted for our snowy mountains, where it would readily establish itself, even on heathy moors. Recommended by Langethal for arid ground, particularly such as contains some lime, being thus as valuable as Festuca ovina. Eligible also for meadows under a system of irrigation.

Avena pubescens, Linné.

Downy Oat-Grass. Europe, North and Middle Asia. A sweet perennial grass, requiring dry but good soil, containing lime. It is nutritious and prolific. One of the earliest kinds, but not well resisting traffic. Several good Oat-grasses are peculiar to North America and other parts of the globe. Their relative value as fodder-grasses is in many cases not exactly known, nor does the limit assigned to this treatise allow of their being enumerated on this occasion.

Averrhoa Carambola, Linné.

Continental and Insular India. Sir Jos. Hooker found this small tree on the Upper Indus as far as Lahore. The fruit occurs

in a sweet and acid variety; the former is raw available for the table, the other for preserves. That of A. Bilimbi (Linné) is of similar use, especially for tarts.

Avicennia officinalis, Linné.

From the coasts of South Asia to those of South Africa, all Australia and New Zealand. It is proposed by Dr. Herm. Behr, to plant this tree for consolidating muddy tidal shores.

Azima tetracantha, Lamarck.

From South India to South Africa. A hedge bush, growing freely in every kind of soil.

Baccharis pilularis, Candolle.

California. This evergreen bush, like B. consanguinea, is grown for hedges, used also for garlands, wrappers of flower-bouquets, and many decorative purposes, as cut branches do not wither for a considerable time. It attains a height of 15 feet (Professor Bolander).

Backhousia citriodora, F. v. Mueller.

South Queensland. Though only a small tree it is well worth cultivating for the fragrance of its lemon-scented foliage.

Bactris Gasipæs, Humboldt. (*Guilielma speciosa,* Mart.)

The Peach Palm of the Amazon River, ascending to the warm temperate regions of the Andes. Stems clustered, attaining a height of 40 feet. Dr. Spruce describes the large bunches of fruits as possessing a thick, firm and mealy pericarp, which, when cooked, has a flavour between potato and chestnut, but superior to either.

Bacularia Arfakiana, Beccari.

In Araucaria forests of New Guinea, up to 6,000 feet. A reed-like Palm.

Bacularia monostachya, F. v. Mueller. (*Areca monostachya,* Martius.)

Eastern Australia, extending to extra-tropical latitudes. One of the best among small Palms for table decoration. The stems sought for walking-sticks.

Baloghia lucida, Endlicher. (*Codiæum lucidum,* J. M.)

East Australia. A middle-sized tree. The sap from the vulnerated trunk forms, without any admixture, a beautiful red indelible pigment.

Balsamodendron Ehrenbergi, Berg.

Deserts of Arabia. This tree yields the Myrrha resin, but perhaps some other species may produce the same substance. Professor Oliver unites this with the following species.

Balsamodendron Mukul, Hooker.

Scinde and Beluchistan. Yields the Bdellium resin.

Balsamodendron Opobalsamum, Kunth. (*B. Gileadense,* Kunth.)

Arabia and Nubia. This species furnishes Mekka or Gilead Balsam. B. Capense (Sonder) is a closely allied species from extra-tropical South Africa. Many other Balsam shrubs deserve introduction.

Bambusa arundinacea, Roxburgh.*

The Thorny Bamboo of India. It likes rich, moist soil, aud delights on river banks. It is of less height than Bambusa vulgaris; it also sends up from the root numerous stems, but with bending branches, thorny at the joints. According to Kurz it will thrive in a climate too dry for B. Tulda and B. vulgaris. The seeds of this and some other Bamboos are useful as food for fowls.

Bambusa aspera, Poiret.

Indian Archipelagus. Attains a height of 120 feet. Stems very strong and thick. This species ascends to elevations of 4,000 feet.

Bambusa Blumeana, Schultes.

Insular India. This Bamboo, with its spiny buds and dependent branchlets, is, according to Kurz, one of the best for cattle-proof live hedges among the Asiatic species. In continental India B. nana and B. arundinacea are much used for the same purpose. Periodic trimming is required.

Bambusa flexuosa, Munro.

China. Only 12 feet high, but very hardy, having resisted in South France a temperature of $-13°$ Cels. $= +8°$ F. (Geoffroy de St. Hilaire.)

Bambusa spinosa, Roxburgh.*

Bengal. A Bamboo attaining 100 feet in height. The central cavity of the canes is of less width than in most other species; thus the strength for many technic purposes is increased.

Bambusa vulgaris, Wendland.*

The large unarmed Bamboo of Bengal. It attains a height of 70 feet, and stems may attain even a length of 40 feet in one season, though the growth is slower in cooler climes. It has proved to be capable of resisting the occasional night-frost of the lowlands of Victoria. It is the best for building bamboo houses. Immersion in water for some time renders the cane still firmer. To the series of large thornless bamboos belong also Bambusa Tulda and Bambusa Balcooa of India, and Bambusa Thouarsii from Madagascar and Bourbon. These Bamboos are much used for various kinds of furniture, mats, implements, and other articles. Besides this, Mr. Kurz enumerates as among the best Asiatic bamboos for building purposes: Gigantochloa aspera, G. maxima, G. atter; while Mr. Teysmann for the same purpose notes G. apus. Kurz recommends further Bambusa arundinacea, B. Balcooa, B. Brandisii, B. polymorpha, Dendrocalamus Hamiltoni, Schizostachyum Blumei. In the Moluccas, according to Costa, Gigantochloa maxima, or an allied species, produces stems thick enough to serve, when slit into halves, for canoes. Bamboos serve for masts and spars of small vessels. Bambusa Balcooa was found by Wallich to grow 12 feet in 23 days. Bambusa Tulda, according to Roxburgh, has grown at first at the rate of from 20 to 70 feet in a month. Fortune noticed the growth of several Chinese bamboos to be two to two and a half feet a day. There are many other kinds of bamboo eligible among the species from China, Japan, India, tropical America, and perhaps tropical Africa. One occurs in Arnhem's Land, and one at least in North Queensland.

Baptisia tinctoria, R. Brown.

The wild Indigo of Canada and the United States. A perennial herb. It furnishes a fair pigment in the manner of treating the best Indigoferas.

Barbaræa vulgaris, R. Brown.

In the cooler regions of all parts of the globe, ascending to Alpine zones. This herb furnishes a wholesome salad. As with other raw vegetables, particularly watercress (Nasturtium aquaticum, Trag.), circumspect care is necessary to free such salads from possibly adherent Echinococcus-ova or other germs of entozoa, particularly in localities where hydatids prevail.

Barosma serratifolia, Willdenow.

South Africa. This shrub supplies the medicinal Bucco leaves.

B. crenulata, Hook. (Diosma crenulata, L.,) is only a variety of this species. Active principles: a peculiar volatile oil, a peculiar resin, and a crystalline substance called diosmin.

Basella lucida, Linné.

India. Perennial. This spinage-plant has somewhat the odour of Ocimum Basilicum; other species serve also culinary purposes.

Basella rubra, Linné.

From South Asia to Japan. This annual or biennial herb serves as a spinage of pleasant colouration.

Batis maritima, Linné.

Central America and northward to Florida, also in the Sandwich Islands. This halorageous shrub can be used to fix tidal sediments for the reclamation of valuable harbour-lands.

Beesha elegantissima, Hasskarl.

Java, or mountains about 4,000 feet high. Very tall and exceedingly slender; the upper branches pendulous. A hardy species of Bamboo.

Benincasa cerifera, Savi.

India. This annual plant produces a large edible gourd, which in an unripe state forms part of the composition of many kinds of currie.

Berberis Asiatica, Roxburgh.

Himalaya. One of the best among numerous species with edible berries. Among these may specially be mentioned B. lycium (Royle) and B. aristata (Candolle), which also yield valuable yellow dye-wood (Dr. Rosenthal).

Berberis buxifolia, Lamarck.

From Magelhaen's Straits to Chili. This bush, according to Dr. Philippi, is the best among the South American species for berries, which are comparatively large, black, hardly acid, but slightly astringent. In Valdivia and Chiloe they are frequently consumed.

Berberis Darwinii, Hooker.

Chiloe and South Chili. Considered one of the most handsome of all shrubs for garden hedges. Several other evergreen Berbery shrubs serve the same purpose.

Berberis Nepalensis, Sprengel.

Himalayas, at elevations between 4,000 and 8,000 feet. The fruit of this evergreen species is edible.

Beta vulgaris, Linné.*

The Beet or Mangold Root. Middle and South Europe, Middle Asia, North Africa. This well-known perennial or biennial herb ought to engage the general and extensive attention of our farming population. The herb is most valuable as a palatable and nutritious spinage; the root is of importance not only as a culinary vegetable, but as well known, also for its content of sugar, fit to be crystallised. That of beet, indeed, is now almost exclusively consumed in Russia, Germany, Austria, France, Sweden, and Belgium; and these countries not only produce the beet sugar, but also export it largely to the neighbouring States. The white Sicilian Beet is mainly used for salads, spinage, and soups. The thick-ribbed variety serves like asparagus or sea-kale, dressed like rhubarb. Cereal soil, particularly such as is fit for barley, is generally adapted also for the culture of beet. The rearing of the root, and the manufacture of the sugar, can be studied from manifold works; one has been compiled by Mr. N. Levy, of Melbourne. A deeply-stirred, drained soil, rich in lime, brings the saccharine variety of beet to the greatest perfection. The Imperial Beet yields from 12 to 20 per cent. sugar. The Castlenauderry, the Magdeburg, the Siberian Whiterib, and the Vilmorin Beet are other varieties rich in sugar. About 5 lbs. of seeds are required for an acre. In rotation of crops, the beet takes its place best between barley and oats. In Middle Europe the yield averages 14 tons of sugar beet to the acre, and as many hundredweight of raw sugar. The mercantile value of the root, at our distilleries, ranged from 20s. to 30s. per ton. In our clime the beet harvest can be extended over a far longer time of the year than in Middle Europe. The extraction of the sap is effected generally by hydraulic pressure. The juice is purified with lime and animal coal. Excess of lime is removed by carbonic acid, and the purified and decolourized juice is evaporated in vacuum pans, with a view to prevent the extensive conversion of the crystallisable sugar into treacle. The production of beet sugar needs far less labour than that of cane sugar, and the harvest is obtained in so short a time as eight months. Beet has shown itself subject neither to alarming diseases nor to extensive attacks of insects. Beet is grown in extra-tropical zones, while the sugarcane is a plant confined to tropical and sub-tropical latitudes. Beet culture, by directly or indirectly restoring the

refuse, ameliorates the soil to such an extent that in some parts of Germany land so utilised has risen to fourfold its former value. Beet furthermore affords one of the most fattening stable-fodders; and thus again an ample supply of manure. In Middle Europe now about one-sixth of all the arable land is devoted to beet, yet the produce of cereals has not become reduced, while the rearing of fattened cattle has increased. Notwithstanding a heavy tax on the beet-sugar factories in Europe, the industry has proved prosperous, and assumes greater and greater dimensions. In 1865 the sugar consumption of Europe amounted to 31,676,497 cwt., one-third of which had been locally supplied by the beet, from over one thousand beet-sugar factories. Treacle obtained from beet is distilled for alcohol. For establishing remunerative factories on a large and paying scale, it has been suggested that farmers' companies might be formed. For ascertaining the percentage of sugar in beet, saccharometers are used. In Germany some scientific periodicals are exclusively devoted to the fostering of this industry.

Betula acuminata, Wallich.

Himalaya, between 3,000 and 10,000 feet. Attains a height of 60 feet, and delights on forest streams. The wood hard, strong, and durable. Another Himalayan Birch, B. utilis (D. Don.), grows on arid ground, and produces good timber of less hardness.

Betula alba, Linné.*

The ordinary Birch of Europe and extra-tropical Asia. With some Willows approaching nearer to the North Pole than any other woody vegetation. It attains a height of 80 feet, and would here thrive best in moist glens of the ranges, or in the higher regions of our mountains, where it would form up at the Alpine zone excellent shelter plantations. The durable bark serves for roofing. Wood white, turning red. The oil of the bark is used in preparing the Russian leather.

Betula lenta, Willdenow.

The Cherry Birch of North America. A tree of middle size, liking moist ground, but is also content with dry soil. Bark aromatic. Wood rose-coloured or dark, fine-grained, excellent for furniture. It is so heavy that when fresh it will not float in water. It is used for ships' keels, machinery, and other purposes where strength, hardness, and durability are required. Red Birch twigs furnish the best material for rough brooms.

Bark of a strong somewhat aromatic odour. Several Birches occur in Japan, which might well be tried here.

Betula lutea, Michaux.

The Yellow or Grey Birch of North-East America. Adapted for moist forest-land. In size and most other respects similar to B. lenta. The wood is used for shoelasts.

Betula nigra, Linné.

The River Birch of North America. One of the tallest of Birches. If grown on the banks of a limpid stream, it will bear intense heat. The wood is compact, of a light colour, easily worked, excellent for turnery, also in use by cabinetmakers and carriage-builders, well adapted to sustain shocks and friction (Robb). The bark is well adapted for roofing.

Betula papyracea, Aiton.

The Paper Birch of North America. A larger tree than B. alba, with a fine-grained wood and a tough bark; the latter much used for portable canoes. It likes a cold situation.

Boehmeria nivea, Gaudichaud.*

The Ramee or Rheea. Southern Asia, as far east as Japan. This bush furnishes the strong and beautiful fibre woven into fabric, which inappropriately is called grass-cloth. The bark is softened by hot water or steam, and then separable into its tender fibres. The best is obtained from the young shoots; it is glossy, tough, and lasting, combining to some extent the appearance of silk with the strength of flax. The ordinary market value of the fibre is about £40 per ton; but Dr. Royle mentions that it has realised, at times, £120. The seeds are sown on manured or otherwise rich and friable soil. In the third year, or under very favourable circumstances even earlier, it yields its crops, as many as three annually. The produce of an acre has been estimated at two tons of fibre. This latter, since Kaempfer's time, has been known to be extensively used for ropes and cordage in Japan. Rich forest valleys seem best adapted for the Ramee, as occasional irrigation can be there applied. In the open grounds of Victoria it suffers from the night frosts, although this does not materially injure the plant, which sends up fresh shoots, fit for fibre, during the hot season. The plant has been cultivated and distributed since 1854, in the Botanic Garden of Melbourne, where it is readily propagated from cuttings, the seeds ripening rarely there. Cordage of this Boehmeria is three times as strong as that of hemp.

Other species require to be tested, among them the one which was recently discovered in Lord Howe's Island,—namely, Boehmeria calophleba.

Boletus bovinus, Linné.

Europe. Besides this species Dr. Goeppert mentions also the following as sold for food in the markets of Silesia: *B. circinans*, Persoon; *B. edulis*, Bull.; *B. luteus*, L.; *B. sapidus*, Harzer; *B. scaber*, Bull.; *B. subtomentosus*, L.; *B. variegatus*, Sw.

Bongardia Rauwolfi, C. A. Meyer.

From Greece through Turkey to the Caucasus. A perennial herb, the leaves of which are utilised like culinary sorrel.

Borassus Aethiopicus, Martius.

Africa, from Zanzibar to Egypt. A Palm of gigantic dimensions, attaining a stem 9 feet in diameter at the base, or 7 feet at 4 feet above the ground; sometimes stems have even been measured having a circumference of 37 feet. The leaves are as much as 12 feet across, serving for baskets, mats, ropes, and sieves. The edible portion of the fruit is yellow, stringy, of a fruity flavour. The sap obtained from incisions in the stem under the leaves yields a kind of palm wine. In its natural home the tree always denotes water (Colonel Grant).

Borassus flabelliformis, Linné.*

The Palmyra. From the Persian Gulf to India, extending to 30° North. This noble Palm attains a height of 100 feet. The pulp of the fruit serves as food. Enormous masses of sugar or toddy are produced in India from the sap, which flows from incisions of the stalk of the unexpended flowers. Also to be reared for scenic plantations.

Boronia megastigma, Nees.

In West Australia on margins of swamps. This remarkable bush is recorded here as an emblem of mourning, its external blackish flowers rendering it especially eligible for graves. Industrially it interests us on account of its powerfully fragrant blossoms, for the sake of which this bush well deserves to be cultivated. The scent might be extracted by Mr. Bosisto's process.

Borrago officinalis, Linné.

South Europe, Orient. An annual herb, occasionally used for medicinal purposes or as an admixture to salad.

Boswellia papyrifera, A. Richard.

Morocco, Nubia, and Abyssinia, forming entire forests about Bertat on the Atlas. This tree exudes a kind of Olibanum resin and represents apparently one of the hardiest species of this and allied genera.

Boswellia thurifera, Colebrooke.

India. A deciduous tree, living in arid forest regions. Yields an aromatic resin. The real Olibanum is exuded by B. Carteri (Birdwood) of Arabia and tropical Africa.

Boussingaultia basselloides, Humboldt.

South America. This hardy climber is well fitted for bowers; the mucilaginous tubers are edible. It is not uncommonly grown as a climber on verandahs.

Bouteloua barbata, Lagasca.

North and Central America. One of the Gramma-grasses of the prairies, called with some other species also Muskit-grass. Annual. For nutritive value famed.

Brabejum stellatifolium, Linné.

South Africa. The nuts of this shrub are edible, resembling those of our Macadamia ternifolia, to which also in foliage and flowers Barbejum is closely allied. The nuts are also similar to those of the Chilian Guevina Avellana. The fruit should be roasted, as otherwise it is deleterious.

Brachychiton acerifolium, F. v. Mueller.

The East Australian Flame-Tree. An evergreen shade-tree, with magnificent trusses of crimson blossoms. Like B. populneum (R. Br.), eligible for promenade lines, when celerity of growth is no object. The mucilaginous sap, when exuded, indurates to a kind of tragacanth.

Brahea dulcis, Martius.

Mexico, as far as its northern parts, and ascending to 3,000 feet. A Brahea Palm has also been discovered as far north as Arizona, 32° (Drude).

Brahea edulis, Wendland.

Lower California, 20 feet high. The clusters of plum-shaped fruits weigh up to 40 lbs., eaten by domestic animals.

Brassica alba, Visiani. (*Sinapis alba,* Linné.)

White Mustard. Europe, North Africa, North and Middle Asia. An annual. The seeds are less pungent than those of the Black Mustard, but used in a similar manner. The young leaves of both are useful as a culinary antiscorbutic salad. Dr. Masters enumerates Brassica Chinensis, B. dichotoma, B. Pekinensis, B. ramosa, and B. glauca among the mustards which undergo cultivation in various parts of Asia, either for the fixed oil of their seeds or for their herbage. From 15 lbs. to 20 lbs. of seeds of the White Mustard are required for an acre. In the climate of California 1,400 lbs. of seeds have been gathered from an acre. Can be grown in shallow soil, even on land recently reclaimed from swamps. It prefers argillaceous ground. The return is in a few months. The stalks and foliage after the seed harvest serve as sheep fodder.

Brassica Chinensis, Linné.

China and Japan. Serves like B. oleracea for cabbage, and may in cultivation produce new varieties. B. Cretica (Lam.), a woody Mediterranean species.

Brassica juncea, J. Hook and Thoms. (*B. Willdenowii,* Boiss.; *Sinapis juncea,* Linné.)

From Middle Africa to China. According to Colonel Drury, cultivated all over India for Sarepta Mustard seeds; also a good salad plant.

Brassica nigra, Koch. (*Sinapis nigra,* Linné.)

The Black Mustard. Europe, North Africa, Middle Asia. An annual. The seeds, simply crushed and then sifted, constitute the mustard of commerce. For medicinal purposes the seeds of this species are preferable for sinapisin and other purposes. In rich soil this plant is very prolific; and in our forest-valleys it is likely to remain free from the attack of aphis. Chemical constituents: a peculiar fixed oil, crystalline sinapin, the fatty sinapisin, myronic acid, and myrosin.

Brassica oleracea, Linné.

An annual or biennial coast plant, indigenous to various parts of Europe. It is mentioned here with a view of showing that it might be naturalised on any rocky and sandy sea-shores. From the wild plant of the coast originated various kinds of cabbages, brocoli, cauliflower, Brussels sprouts, kail, kohlrabi, &c. Some regard the fattening qualities of cabbages as superior to those of turnips, particularly for stable food during

the autumnal season. The gluten of cabbages on one acre has been estimated at 1,500 lbs. against 1,000 lbs. of gluten obtainable from turnips. Other races of this species are collectively represented by Brassica Rapa, L. (B. campestris, L.), the wild Navew, yielding most of the varieties of turnips, some with other cultivated forms transferred to us from ancient times. Again, other varieties are comprehended within Brassica Napus, L., such as the Swedish and Teltower Turnips, while the Rape seed, so important for its oil (Colza), is also derived from a form of B. Napus. The Rape should be produced here as an agrarian produce, giving a rapid return, wherever it should remain free of aphis. The hardier turnips could be produced on our highest Alps, as they are grown still within the Arctic circle, and, according to Sir J. Hooker, at a height of 15,000 feet in the Himalaya mountains.

Bromus asper, Murray.

Europe, North and Middle Asia. A good perennial fodder grass for wood regions, but, like Festuca gigantea, late in the season.

Bromus erectus, Hudson.

Europe, North Africa. Important as a perennial nutritious grass for dry limestone regions; much liked by cattle and sheep.

Bromus unioloides, Humboldt.* (*B. Schraderi,* Kunth.)

In Australia called the Prairie Grass. From Central America to the sub-alpine zone of Northern Argentina. It has spread over many parts of the globe. The writer saw it disseminated in the mountains of St. Vincent's Gulf as early as 1847. It is one of the richest of all grasses, grows continuously and spreads readily from seeds, particularly on fertile and somewhat humid soil, and has proved, as a lasting and nutritious fodder grass or pasture grass, one of our best acquisitions. Very early out in the season for fodder.

Broussonetia papyrifera, Ventenat.

The Paper Mulberry. Islands of the Pacific Ocean, China Japan, perhaps only truly indigenous in the last-named country. The bark of this tree or shrub can be converted into very strong paper. It can also be used for textile fabric; furthermore, the fabrics made from it can be dressed with linseed oil for waterproof coverings. In cultivation the plant is kept like an osier. The leaves cannot be used for silkworms. European fabrics have largely superseded the clothing made of this plant in the South Sea Islands.

Buchloa dactyloides, Torrey.*

The true Buffalo Grass of Kansas, naturally extending from Canada to Texas, forming a large proportion of the food of the buffaloes on the prairies (Engelmann). Diœcious, creeping, only rising to half a foot or less. It is extremely fattening, but apt to be suppressed by coarser grasses on places where these are not trampled out or kept down by the pasture animals.

Buddleya Madagascariensis, Lamarck.

Madagascar. Of the numerous species of Buddleya, the most eligible for shelter copses on account of its great size and always tidy appearance, as well as vigour and celerity of growth. It is ever-flowering and highly elegant.

Bursera elemifera, J. Hooker.

Mexico, up to the temperate plateau. This tree furnishes the Mexican Copal or Elemi.

Butea frondosa, Roxburgh.

The Dhak or Pulas of India. This magnificent tree extends to the Himalaya mountains, ascending to elevations of 4,000 feet. It is very rich in a peculiar kind of kino, which, according to Muspratt, contains up to 73 per cent. of tannin. The Lac insect is also nourished by this tree.

Butomus umbellatus, Linné.

The Flowering Rush. Europe, North and Middle Asia. This elegant perennial water plant is mentioned here more for its value in embellishing our lakes and water-courses than for the sake of its roots. The latter, when roasted, are edible. The plant would live in our sub-alpine rivulets.

Buxus sempervirens, Linné.

The Turkey Box Tree. South Europe, North Africa, South-West Asia extending to Japan. This slow-growing tree should timely be planted, to provide the indispensable box-wood for wood engravers and musical instrument makers, as yet no good substitute for it having been discovered. The box-tree needs calcareous soil for its best development. Among allied species B. Balearica attains a height of 80 feet. Other congeners are B. subcolumellaris, B. Cubana, B. Purdieana, B. citrifolia, B. acuminata, B. lævigata, B. Vahlii, B. gonoclada, B. retusa, B. glomerata, B. Wrightii, all from West India; further, B. Madagascarica, B. longifolia from Turkey, B. Wallichiana from the Himalayas, and B. microphylla from Japan; but neither of any of these, nor of the

various species of the allied Indian genus Sarcococca, nor of several species of the Andine genus Styloceras, does it appear to be known what relation their wood may hold to that of the true Box Tree, and whether they are more rapid in growth.

Cæsalpinia brevifolia, Bentham. (*Balsamocarpon brevifolium,* Clos.)
Chili. The pods of this shrub are extraordinarily rich in tannic acid, containing up to 80 per cent., and hence valuable for tanneries (Philippi). The process of tanning is accomplished in one-third of the time required for leather from oak bark; especially valuable as giving a bloom to the leather.

Cæsalpinia coriaria, Willdenow.
Wet sea-shores of Central America. Might be naturalised in our salt marshes. Colonel Drury states that each full-grown tree produces annually about 100 lbs. of pods, the husk of which, commercially known as Divi-Divi, is regarded as the most powerful and quickly-acting tanning material in India. The mercantile price of the pods is from £8 to £13 per ton.

Cæsalpinia crista, Linné.
West India and Carolina. This shrub or tree furnishes a yellow dye wood.

Cæsalpinia echinata, Lamarck.
Brazil. The Fernambuc or Red Brazil Wood is obtained from this tree and allied species; they also furnish the dye principle *brazilin.*

Cæsalpinia Gilliesii, Wallich. (*Poinciana Gilliesii,* Hooker.)
La Plata States. This beautiful hardy bush can be utilised for hedges.

Cæsalpinia Sappan, Linné.
South Asia. The wood furnishes red dye. This shrub can also be utilised for hedges.

Cæsalpinia sepiaria, Roxburgh.
South Asia, east to Japan. Can be utilised as a hedge bush. It can advantageously be mixed for hedge growth with *Pterolobium lacerans* (R. Br.), according to Dr. Cleghorn. It furnishes a red dye wood.

Cæsalpinia tinctoria, Humboldt.
Chili. The bark yields a red dye.

Cæsalpinia vesicaria, Linné. (*C. bijuga*, Swartz.)

West India, on dry savannahs and limestone rocks. This tree furnishes part of the red Fernambuc Wood of commerce for dye purposes and select implements.

Cajanus Indicus, Candolle.

The Catjang; in Assam, called Gelooa-mah, also called Arhar. A shrubby plant of tropical Africa and India, ascending to 6,000 feet in the already extra-tropical latitudes of the Himalayas. It sustains itself on dry ground, and yields the pulse known as Dhal, Urhur, and Congo Pea. The plant lasts for about three years. Attains a height of 15 feet, and has yielded in the richest soil of Egypt 4,000 lbs. of peas to the acre. A crop is already obtained in the first year. The seeds can be used as peas in the green, as well as mature, state. Even more used daily in India than Phaseolus radiatus and Cicer arietinum. Some of the tribes of Central Africa use the stem of this shrub in friction with reeds to strike fire, according to Speke. Several species of Cajanus of the Atylosia section, indigenous to the warmer parts of Australia, might be tested for the sake of the economic value of their seeds. The insect, active in the formation of Lac, lives extensively on the Cajanus, according to Mr. T. D. Brewster, of Assam. Silkworms live also on it.

Cakile maritima, Scopoli.

Europe, North Africa, North and Central America, extra-tropical Australia. Not unimportant for aiding to cover drift-sand cast up on low sea-shores; not hurt by the spray.

Calamagrostis longifolia, Hooker.

North America. Excellent for fixing drift-sand.

Calamintha Nepeta, Hoffmansegg.

It is of the strongest odour among several species, but not of so pleasant a scent as C. incana (Boiss.) and C. grandiflora (Moench).

Calamintha officinalis, Moench.

Middle and South Europe and Middle Asia, North Africa. A perennial herb, used like melissa as a condiment.

Calamus montanus, T. Anderson.

Himalaya, up to 6,000 feet. A hardy climbing Palm. The aged canes are naked. "The light but strong suspension bridges, by which the large rivers of Sikkim are crossed, are

constructed of this palm. It supplies material for the strongest ropes for dragging logs of wood from the forests. The most durable baskets and the cane-work of chairs are manufactured from the slit stems. Walking-sticks and riding-canes made of this species are exported from Sikkim in considerable quantity." Many other Calami serve similar purposes, but probably few, or perhaps none, are equally hardy.

Callitris quadrivalvis, Ventenat.

North Africa. A middling-sized tree, yielding the true sandarac resin.

Calyptranthes aromatica, St. Hilaire.

South Brazil. The flower-buds of this Spice shrub can be used almost like cloves, the berries like allspice. Several other aromatic species are eligible for test culture.

Camelina sativa, Crantz.

Middle and South Europe, temperate Asia. An annual herb, cultivated for the sake of its fibre and the oil of its seeds. It is readily grown after corn-crops, yields richly even on poor soil, and is not attacked by aphis. Mr. W. Taylor obtained 32 bushels of seeds from an acre, and from these 540 lbs. of oil. The return is within a few months.

Camellia Thea, Link. (*Thea Chinensis*, Linné.)

The Tea shrub of South-Eastern Asia, said to be indigenous also to some localities of Japan,—for instance, Suruga. This evergreen and ornamental bush has proved quite hardy in the lowlands at Melbourne, where in exposed positions it endures without any attention our night frosts as well as the free access of scorching summer winds. But it is in humid valleys, with rich alluvial soil and access to springs for irrigation, where only the most productive tea fields can be formed. The plant comes into plentiful bearing of its product as early as the Vine and earlier than the Olive. Its culture is surrounded with no difficulties, and it is singularly exempt from diseases, if planted in proper localities. Pruning is effected in the cool season, in order to obtain a large quantity of small tender leaves from young branches. Both the Chinese and Assam tea are produced by varieties of one single species, the tea shrub being indigenous in the forest country of Assam. Declivities are best adapted and usually chosen for tea culture, particularly for Congo, Pekoe, and Souchong, while Bohea is often grown in flat countries. In Japan tea cultivation extends to 39° north latitude, where the thermometer occasionally sinks

to 16° F. (Simmons). For many full details Fortune's work, "The Tea Districts of China," might be consulted. The very troublesome Tea Bug of Asia is Helopeltis theivora. Fumigation and the application of birdlime are among the remedies to cope with this insect. The third volume of the Journal of the Agricultural and Horticultural Society of India is mainly occupied by Lieut.-Colonel Edw. Money's and Mr. Watson's elaborate essays on the Cultivation and Manufacture of Tea in India. For full advice on the culture and preparation of tea consult the writer's printed lecture, delivered in 1875 at the Farmers' Club of Ballarat.

The tea of commerce consists of the young leaves, heated, curled, and sweated. The process of preparing the leaves can be effected by steam machinery; a machine of particular construction has been suggested recently by Mr. Joachimi according to requirements explained by the writer. In 1866 three machines for dressing tea have been patented in England, one by Messrs. Campbell and Burgess, one by Mr. Thomson, and one by Mr. Tayser. To give an idea of the quantity of tea which is consumed at the present time, it may be stated that, from June to September 1871, 11,000,000 lbs. of tea were shipped from China alone to Australia, and that the produce of tea in India from January to June of 1872 has been 18,500,000 lbs. India sent only a first small sample of tea in 1840 to the European market, but exported in 1877 to England forty millions of lbs.,—that is, as much as the whole English importation thirty years ago (Burrell). Seeds of the tea bush are now in many parts of Australia locally to be gathered from plants distributed by the writer, and for years to come the cultivation of the tea bush, merely to secure local supplies of fresh seeds, ready to germinate, will in all likelihood prove highly lucrative. Tea contains an alkaloid: coffein, a peculiar essential oil, and Bohea acid, along with other substances.

Canavalia gladiata, Candolle.*

Within the tropics of Asia, Africa, and America. This perennial climber grows to an enormous height and bears an abundant crop of edible beans (Sir Walter Elliott) with large seeds, which can be used green. It varies with red and white seeds and in the size of the latter, which are wholesome. *C. ensiformis* (Cand.) is another variety.

Canna Achiras, Gillies.

Mendoza. One of the few extra-tropic Cannas, eligible for arrowroot culture.

Canna coccinea, Roscoe.

West India. Yields with some other Cannas the particular arrowroot called Tous Les Mois.

Canna edulis, Edwards.

The Adeira of Peru. One of the hardiest of arrowroot plants. Seeds, even if many years old, will germinate. This species has yielded excellent starch at Melbourne, Western Port, Lake Wellington, Ballarat, and other localities, from plants supplied at the Botanic Garden of Melbourne. The Rev. Mr. Hagenauer, of the Gippsland Aboriginal Mission station, obtained 220 lbs. of arrowroot from one-eighth of an acre of this Canna. The gathering of the roots is effected about April. The plants can be set out in ordinary ploughed land. Captain James Hall, of Hastings, prepared also largely the starch from this root. Starch grains remarkably large. The plant resembles a Banana in miniature, hence eligible for scenic plantations; the local production in Gippsland is already large enough to admit of exportation.

Canna flaccida, Roscoe.

Carolina. Probably also available for arrowroot, though in the first instance, like many congeners, chosen only for ornamental culture.

Canna glauca, Linné.

One of the West Indian Arrowroot Cannas.

Cannabis sativa, Linné.

The Hemp Plant; indigenous to various parts of Asia, as far west as Turkey and as far east as Japan. Cultivated for its fibre since ancient times. Particularly in hot climes it exudes the churras, a resinous substance of narcotic intoxicating property. The foliage contains also a volatile oil, while the seeds yield by pressure the well-known fixed hemp oil. The staminiferous plant is pulled for obtaining the fibre in its best state immediately after flowering; the seeding plant is gathered for fibre at a later stage of growth. Good soil, well drained, never absolutely dry, is needed for successful hemp culture. Hemp is one of the plants yielding a full and quick return within the season. The summer temperatures of St. Petersburg (67° F.) and of Moscow (62° F.) admit of the cultivation of this plant. The hemp as a narcotic plant serves as a protection against insects on cultural fields, if sown along their boundaries.

Cantharellus edulis, Persoon. (*C. cibarius*, Fries.)

Various parts of Europe. Dr. Goeppert mentions this among the many mushrooms admitted under Government supervision for sale in Silesia.

Capparis sepiaria, Linné.

From India to the Philippine Islands, ascending to cool elevations and living in arid soil. A prickly bush, excellent for hedges. Dr. Cleghorn mentions also as hedge plants C. horrida (L. fil.), C. aphylla (Roth), C. Roxburghii (Cand.), some of which yield also capers.

Capparis spinosa, Linné.

The Caper Bush. South Europe and North Africa, South Asia and North Australia. A somewhat shrubby and trailing plant, deserving, even for the sake of its handsome flowers, a place in any garden. It sustains its life in the most arid deserts. Light frosts do not destroy this plant. The flower-buds and young berries preserved in vinegar with some salt form the capers of commerce. Samples of capers, prepared from plants of the Botanic Garden of Melbourne, are placed in our Industrial Museum, together with many other industrial products emanating from the writer's laboratory. The caper plant is propagated either from seeds or suckers; it is well able to withstand either heat or drought. The buds after their first immersion into slightly salted vinegar are strained and afterwards preserved in bottles with fresh vinegar. Chemical principle: rutin.

Capsicum annuum, Linné.

Central America. An annual herb, which yields the chillies, and thus also the material for cayenne pepper. Chemical principle: capsicin, an acrid, soft, resinous substance.

Capsicum baccatum, Linné.

The Cherry Capsicum. A perennial plant. From Brazil brought to tropical Africa and Asia, where now other pepper capsicums are likewise naturalised.

Capsicum frutescens, Linné. (*C. fastigiatum*, Blume.)

Tropical America. The berries of this shrubby species are likewise converted into cayenne pepper.

Capsicum longum, Candolle.

Some of the hottest parts of America. An annual herb, also

yielding cayenne pepper. Fraas believes this plant, as an oriental one, to have been known already to Theophrastos and Dioscorides. C. grossum (Willd.) is also mentioned by Colonel Drury as a very pungent species. The summers of the warm temperate zone admit of the successful growth of at least the annual species of capsicum in all the lowlands. C. humile binds also sands even when salty.

Capsicum microcarpum, Candolle.

South America. It is this species which is preferentially used in Argentina. There are annual and perennial varieties.

Caragana arborescens, Lamarck.

The Pea Tree of Siberia. The seeds are of culinary value, but particularly used for feeding fowl. The leaves yield a blue dye (Dr. Rosenthal).

Carex arenaria, Linné.

Europe and North Asia. One of the most powerful of sedges for subduing rolling sand, not attracting pasture animals by its rigid foliage. The roots are of medicinal value.

Carex Moorcroftiana, Falconer.

The Loongmur of the Alps of Thibet. One of the best of sedges for staying the shifting sand by its deeply penetrating and creeping roots. It forms an intricate net-work on the surface and beneath, outliving most other fodder plants at its native places; it becomes available for cattle and horse food, particularly in the cold of winter, and is held to be singularly invigorating to pasture animals.

Carissa Arduina, Lamarck.

South Africa. A shrub with formidable thorns, well adapted for boundary lines of gardens, where rapidity of growth is not an object. Quite hardy at Melbourne. C. ferox (E. Meyer) and C. grandiflora (A. de Cand.) are allied plants of equal value. The East Australian, C. Brownii (F. von Mueller), can be similarly utilised. The flowers of all are very fragrant. C. Carandas (Linné) extends from India to China; its berries are edible.

Carpinus Americana, Michaux.

The Water Beach or Ironwood of North America, thriving best on the margins of streams. The wood is very fine grained,

tough and compact, used for cogs of wheels and any purpose where extreme hardness is required, such as yokes, etc. (Robb). It is often speckled and somewhat curled, thus fitted for superior furniture (Simmons).

Carpinus Betulus, Linné.

The Hornbeam. A tree 80 feet high. Middle and South Europe. Wood pale, of a horny toughness and hardness, close-grained, but not elastic. It furnishes a good coal for gunpowder. This tree would serve to arrest the progress of bush fires, if planted in copses or hedges like willows and poplars around forest plantations. Four species occur in Japan: C. cordata, C. erosa, C. laxiflora, C. japonica (Blume). Carpinus viminea (Wallich) is a species with durable wood from the middle regions of Nepal.

Carthamus tinctorius, Linné.

From Egypt to India. The Safflower. A tall annual, rather handsome herb. The florets produce yellow, rosy ponceau, and other red shades of dye, according to various admixtures. Pigment principles: carthamin and carthamus yellow. For domestic purposes it yields a dye ready at hand from any garden. In India the Carthamus is also cultivated for the sake of the oil which can be pressed from the seeds.

Carum Ajowan, Bentham. (*Ptychotis Ajowan*, Candolle.)

India. The fruits of this annual herb form an excellent culinary condiment with the flavour of thyme. Its peculiar oil is accompanied by cymol and thymol.

Carum Bulbocastanum, Koch.

Middle and South Europe, North Africa, Middle Asia, on limestone soil. The tuberous roots serve as a culinary vegetable, the fruits as a condiment.

Carum Capense, Sonder.

South Africa, where the edible, somewhat aromatic root is called Fenkelwortel.

Carum Carui, Linné.

The Caraway-Plant. Perennial. Europe, North and Middle Asia. It might be naturalised on our Alps and also along our sea-shores. The Caraway oil is accompanied by two chemical principles: carven and carvol.

Carum ferulifolium, Koch. (*Bunium ferulifolium*, Desfont.)

A perennial herb of the Mediterranean regions. The small tubers are edible.

Carum Gairdneri, Bentham.

Western North America, particularly in the Sierra Nevada. A biennial herb, the tuberous root of which furnishes an article of food as well as the root of the allied Californian C. Kelloggii (A. Gray). Geyer probably had this plant in view, when he mentions the tubers of an umbelliferous plant, which are among the dainty dishes of the nomadic Oregon natives. The truly delicious root bursts on being boiled, showing a snowy white farinaceous substance, which has a sweet, cream-like taste, and somewhat the aroma of parsley leaves (Lindley).

Carum nigrum, Royle.

Himalaya. With C. gracile this yields caraway-like fruits.

Carum Petroselinum, Bentham. (*Apium Petroselinum*, Linné.)

The Parsley. The biennial well-known herb, indigenous to South Europe and the Orient. Always desirable on pastures as a preventive or curative of some kidney and liver diseases of sheep, horses, and cattle. The root is also valuable for the table. Essential oil peculiar with stearopten.

Carum segetum, Bentham. (*Anethum segetum*, Linné.)

Around the Mediterranean Sea, extending to Middle Europe. An aromatic annual herb, available for culinary purposes.

Carya alba, Nuttall.*

The Shellbark-Hickory. A deciduous tree, 90 feet high, which delights in rich forest soil; a native of North America. Wood strong, elastic, and tenacious, but not very durable, used for chairs, whip-handles, &c. Yields the main supply of hickory nuts. All the hickories are extensively used in North America for hoops.

Carya amara, Nuttall.

The Bitternut-Tree or Swamp Hickory. A tree, 80 feet high, in swampy grounds of North America. Wood less valuable than that of other hickories. Richest of all North American trees in potash, along with most hickories.

Carya glabra, Torrey.* (*Carya porcina*, Nuttall.)

The Hognut-Tree, 80 feet high, in forest land of North

America. Wood very tough; the heart wood reddish or dark-coloured; much used for axletrees and axe-handles.

Carya microcarpa, Nuttall.

The Balsam-Hickory. North America. A fine lofty tree attaining a height of 80 feet, and a stem of 2 feet in diameter. The wood is white and tough, and possessed of most of the good qualities of C. tomentosa, to which this species is also in other respects allied. The nut is of a pleasant taste, but small (Nuttall).

Carya oliviformis, Nuttall.*

The Pecan-Nut Tree of North America. A handsome lofty tree up to 70 feet high, with a straight trunk. The most rapid growing of all the hickories (Meehan). Its wood is coarse-grained, heavy and compact, possessing great strength and durability; in strength and elasticity it surpasses even that of the White Ash (Harrison) and is quite as durable. The nuts, which are usually abundant, are from an inch to an inch and a half long, and are the most delicious of all walnuts; they form an object of commerce in the Southern States. The tree commences to bear nuts in about 8 years; they should be packed in dry moss or sand for distant transmission. Although the wood of all the hickories is not adapted for building purposes, as it is easily attacked by insects and soon decays if exposed to the weather, yet its great strength and elasticity render it extremely useful for implements, articles of furniture, hoops, and many minor uses, besides supplying locally the very best of fuel. Hickories, even when very young, do not well bear transplantation, except perhaps C. amara. C. alba and C. glabra would be particularly recommendable for the sake of their timber, and C. oliviformis on account of its fruit. The bark of all the hickories contains yellow-dye principles; by addition of copperas an olive colour is produced; by addition of alum a green colour.

Carya sulcata, Nuttall.*

The Furrowed Hickory and Shelbark Hickory of some districts; also Shagbark Hickory. A tree, 80 feet high, in damp woods of North America. Its rate of growth is about 18 inches in a year while young. Heartwood pale-coloured. Seed of sweet pleasant taste.

Carya tomentosa, Nuttall.*

The Mocker-Nut Tree or White Heart Hickory. A big tree

of North America. Likes forest soil, not moist. Heartwood pale-coloured, remarkable for strength, elasticity, heaviness and durability, yet fissile, used for axles, spokes, felloes, handles, chairs, screws, sieves, and the best of mallets; the saplings for hoops and wythes. Hickory is the most heat-giving amongst all North American woods. Seeds very oily. Nut small, but sweet. A variety produces nuts as large as an apple.

Caryota urens, Linné.

India. One of the hardier Palms, ascending, according to Dr. Thomas Anderson, the Himalayas to an altitude of 5,000 feet, yet even there attaining a considerable height, though the temperature sinks in the cooler season to 40° Fahrenheit. Drude mentions that species of this genus reach up to an elevation of 7,500 feet, where the temperature occasionally approaches the freezing point. The trunk furnishes a sago-like starch. This Palm flowers only at an advanced age, and after having produced a succession of flowers dies away. From the sap of the flowers toddy and palm sugar are prepared, as well as from the Cocos and Borassus Palm; occasionally as much as twelve gallons of toddy being obtained from one tree in a day. The fibre of the leaf stalks can be manufactured into very strong ropes, also into baskets, brushes, and brooms. The outer wood of the stem serves for turnery.

Casimiroa edulis, Llav and Lexarz.

Mexico, up to the cool heights of 7,000 feet, bearing orange-like fruits (Seemann). This tree comes into bearing in about ten years; the kernel is deleterious (Hernandez); the pulp of a delicious, melting, peach-like taste (Garnier). The fruit is said to induce sleep.

Cassia acutifolia, Delile.

Indigenous, or now spontaneous, in Northern and Tropical Africa and South-West Asia. Perennial. The merely dried leaflets constitute part of the Alexandrian and also Tinnevelly senna. The active principle of senna—namely, cathartic acid—occurs also in the Coluteas and in Coronilla varia, according to C. Koch.

Cassia angustifolia, Vahl.

Northern and Tropical Africa and South-Western Asia, indigenous or cultivated. Perennial. Yields Mecca senna, also the Bombay and some of the Tinnevelly senna.

Cassia fistula, Linné.

South Asia. The long pods of this ornamental tree contain an aperient pulp of pleasant taste, of medicinal value ; also used in the manufacture of cake tobacco. Traced by Sir Jos. Hooker to the dry slopes of the Central Himalayas.

Cassia Marylandica, Linné.

An indigenous Senna plant of the United States of North America. Perennial.

Cassia obovata, Colladon.

South-West Asia; widely dispersed through Africa as a native or disseminated plant. Perennial. Part of the Alexandrian and also Aleppo senna is derived from this species, less esteemed and less collected, however, than the other species. It furnishes also Tripolis, Italian, Senegal, and Tanacca senna. Several of the Australian desert cassias of the group of C. artemisioides may also possess purgative properties. The odour of their foliage is almost that of senna.

Castanea sativa, Miller.* (*C. vesca*, Gaertner.)

The Sweet Chestnut Tree. South Europe and temperate Asia, as far as Japan, and a variety with smaller fruits extending to North America. It attains an enormous age; at Mount Etna an individual tree occurs with a stem 204 feet in circumference. At other places trees are found 10 feet in diameter, solid to the centre. The tree does not readily admit of transplantation. The wood is light, coarse-grained, strong, elastic and durable, well adapted for staves, wheel cogs, &c., the young wood for hoops and mast rings. The wood is comparatively rich in tannic acid (about 18 per cent.), and thus used for preparing a liquid extract. The importance of the tree rests on its adaptability for shade plantations, its nutritious nuts and timber value. The American wood is slightly lighter in colour than that of the Red Oak and valuable for its durability, thus available for shingles and rails; chestnut rails in North America have lasted for half a century. The wood is beautifully laminated and thus sought for furniture (Simmons). Dr. Vasey mentions that the wood is largely employed for furniture, for the inside finish of railroad cars and steamboats. The nuts, smaller but sweeter than the European, are important for fattening hogs (Robb).

Castanopsis argentea, A. Candolle.

A lofty tree in the mountains of India, produces also edible

chestnuts. Other species of the genus Castanopsis are valuable.

Castanopsis chrysophylla, A. deCandolle.

The Oak Chestnut of California and Oregon. A tree attaining a large size and beautiful outlines. The leaves are golden yellow underneath. Wood durable.

Castanopsis Indica, A. deCandolle.

Mountains of India, at about 4,000 feet. This Oak Chestnut produces seeds with the taste of filberts.

Casuarina Decaisneana, F. v. Mueller.

Central Australia, where it is the only species of the genus. This tree is one of the largest among its congeners, and particularly valuable for arid regions.

Casuarina distyla, Ventenat.

Extra-tropical Australia. A shrubby species, well adapted for fixing the sand-drifts of sea-coasts. All Casuarinas can be pollarded for cattle fodder.

Casuarina equisetifolia, Forster.

East Africa, South Asia, North Australia, Polynesia. Attains a maximum height of 150 feet. Splendid for fuel, giving great heat and leaving little ashes. The timber is tough, nicely marked. The tree will live in somewhat saline soil at the edge of the sea. Captain Campbell-Walker estimates the yield of firewood from this tree four times as great as the return from any tree of the forests of France. In India it grows on pure sand and is much used as fuel for railway locomotives. The cost of rearing Casuarinas in India has been from £4 to £10, and the return after only 8 years £13 to £32.

Casuarina Fraseriana, Miquel.

South-West Australia. A middle-sized tree; the wood easily split into shingles. The best furniture wood of South-Western Australia, as it does not rend. This tree is adapted even for sterile heath land.

Casuarina glauca, Sieber.

The Desert Sheoak, widely distributed through Australia, but nowhere in forest-like masses. This species attains, in favourable places, a height of 80 feet. Its hard durable wood is valuable; used for staves (Woolls). Important for its rapid

growth, resistance to exposure for shelter plantation, and a speedy supply of fuel,—a remark which applies also to the following species.

Casuarina quadrivalvis, Labillardière.

The Coast Sheoak of South-East Australia, but not merely living in coast sand, but also on barren places up to the hills inland. Height to 60 feet. The male tree is very eligible for avenues, the foliage of the species being drooping. Cattle are fond of the foliage. For arresting the ingress of coast sand by belts of timber, this is one of the most important trees. It produces, like other Casuarinas, seeds early and copiously, and is easily raised. The foliage, like that of the other species, acidulous from a crystallisable substance allied to bicitrate of lime.

Casuarina suberosa, Willdenow.

The erect Sheoak of South-East Australia. Height to 40 feet. A beautiful shady species. Casuarina trichodon (Miq.) and C. Huegeliana (Miq.) are arboraceous species of South-West Australia, all valuable for their wood.

Casuarina torulosa, Aiton.

New South Wales and Queensland. Attains a height of 70 feet. The tough wood of this handsome tree is in demand for durable shingles and furniture work, as well as for staves and veneers; it is also one of the best for oven fuel.

Catalpa bignonioides, Walter.*

On the Gulf of Mexico. A tree in a warm, humid climate, of remarkable celerity of growth, attaining a height of about 20 feet in four years. Professor Meehan observed a tree to attain a stem of 4 feet in diameter in twenty years, even in the clime of New York. In many of the United States it is a favourite tree for shade lines. When closely planted it will grow tall and straight, attaining a stem of 50 feet up to the first branch; it prefers bottom lands, but will grow in any soil and position, according to Mr. Barney. It is hardier than most Eucalypts, but will not stand severe frosts. According to Professor Burrill, it is not liable to be destroyed by insects. Comes early into bearing of seeds. Professor Meehan regards the wood to be as durable as that of the best Chestnut trees; indeed, it lasts for an almost indefinite period. General Harrison insists that there is nothing like it for posts. Catalpa pickets of the old French stockade are still sound. Logs

thrown across water-courses for crossing have lasted for three generations; railway posts from it are almost indestructible, and so are platforms. Logs a century old, and posts half a century, were not the least decayed (Barney). Railway cross-ties made of this wood are also very lasting, a tree 20 years old furnishing sufficient for four ties. Canoes of Catalpa wood never crack or decay.

Catha edulis, Forskoel.

Arabia and Eastern Africa. The leaves of this shrub under the designation of Kafta or Cat are used for a tea of a very stimulating effect, to some extent to be compared to that of Erythroxylon Coca. To us here the plant would be mainly valuable for medicinal purposes.

Ceanothus rigidus, Nuttall.

California. One of the best of hedge shrubs, available for dry situations. Evergreen; up to 12 feet high; the branches become densely intricate. In the coast tracts it is replaced by C. thyrsiflorus, Esch., which can also be used for hedges and copses, and will live in mere coast sand. C. prostratus, Benth., likes to form natural mats on slopes formed by roads and slides, which it gradually covers, and with its pretty blue flowers soon decorates (Professor Bolander).

Cedrela Brasiliensis, A. deJussieu.* (*C. fissilis,* Velloza.)

South Brazil and Argentina, occurring also in Mexico. The wood is soft, fragrant, and easily worked; it is known as Acajou wood.

Cedrela Sinensis, A. deJussieu.

China. An elegant tree, hardy in Middle Europe. It furnishes a wood not unlike that of the Singapore Cedar, reddish in colour, particularly sought for cigar boxes.

Cedrela Taona, Roxburgh.*

The Singapore Cedar. Ascends the Himalayas to 8,000 feet. A mere variety of this is the Red Cedar of East Australia (*Cedrela Australis,* F. v. M.). Attains a height of 200 feet; foliage deciduous. The Rev. Dr. Woolls noted in New South Wales trees so large as to yield 30,000 feet (superficial) of timber. Marked value in Brisbane £7-10 to £8-10 per 1,000 superficial feet (Queensland Exhibition, 1878). The light beautiful wood, easily worked and susceptible of high polish, is much in request for furniture, for the manufacture of

pianofortes, for boat-building, and a variety of other work. The timber from the junction of the branches with the stem furnishes the choicest veneers. The bark contains a considerable quantity of tannin, which produces a purplish leather (Fawcett). The Red Cedar is hardy at Melbourne, but in our open, exposed gardens and poor soil, of slow growth.

Cedrela Velloziana, Roemer.

Brazil. A magnificent tree, with odorous wood of a red hue.

Cedronella cordata, Bentham.

United States of North America. A perennial herb, fragrant like the following.

Cedronella triphylla, Moench.

Madeira and Canary Islands. A shrubby plant with highly scented foliage. The volatile oil obtainable from it resembles that of Melissa, but is somewhat camphoric.

Celtis Australis, Linné.

The Lotus Tree of South Europe, North Africa, and South Asia, ascending the Himalayas to 9,000 feet. Attains a height of about 50 feet. Though of rather slow growth, this tree can be used for avenues, as it finally attains a stem 6 feet in diameter, and it is supposed that this Celtis reaches the age of fully 1,000 years. Berries edible. Wood hard and dense, eligible, particularly for turners' and carvers' work. The stem wood is fine-grained, easily cleft, and of a splendid yellow tinge; the branch wood is one of the best for whip sticks.

Celtis occidentalis, Linné.

The Huckberry Tree. A fine forest tree in Ohio and other parts of North America. Height 80 feet. The variety called C. crassifolia is the best. The sweet fruits edible. Wood elastic and fissile.

Celtis Tala, Gillies.

From Texas to the La Plata States. A thorny shrub, or under favourable circumstances a good-sized tree. This plant can be used for forming impenetrable hedges or shade avenues. One or two other Argentine species serve the same purpose.

Cephælis Ipecacuanha, Richard.

Brazil, in woods of mountains, consociated with Palms and Fern trees. It is not unlikely that this herb, which is

perennial and yields the important medicinal Ipecacuanha root, would live in our warmer forest regions, such as those of East Gippsland, Active principles: emetin and ipecacuanha acid.

Cephalotaxus drupacea, Siebold et Zuccarini.

China and Japan. This splendid Yew attains a height of 60 feet, and is very hardy. According to Dr. Masters the C. Fortunei (Hooker) is merely a variety.

Ceratonia Siliqua, Linné.

The Carob Tree of the Mediterranean regions. It attains a height of 30 feet and resists drought well; succeeds best on a calcareous subsoil. Wood pale red. The saccharine pods, Algaroba or St. John's Bread, of value for domestic animals. The seeds germinate readily. The exportation of the pods for cattle food from Creta alone is now about 180,000 tons annually (Dr. Masters). In some of the Mediterranean countries horses and stable cattle are almost exclusively fed upon the pods. The meat of sheep and pigs is greatly improved in flavour by this food, the fattening properties being twice that of oil-cake. The pods contain about 66 per cent. of sugar and gum. To horses and cattle 6 lbs. a day are given of the crushed pods, raw or boiled, with or without chaff. The Spanish conquerors took this plant early to Central and South America.

Cercocarpus ledifolius, Nuttall.

California. Rises in favourable spots to a tree 40 feet high, with a stem diameter of 2½ feet. The wood is the hardest known in California. C. parvifolius is of lesser dimensions.

Cereus Engelmanni, Parry.

Utah. A dwarf species with large scarlet flowers, and refreshingly cool fruits of strawberry taste. C. Lecontei attains there to the size of a flour-barrel. Columnar species of Cereus, rising to 40 feet high, occur also in Argentina.

Cereus Quixo, Gay.

Chili. This stately Cactus attains a height of 15 feet, and is one of the hardiest species. The charming snow-white flowers are followed by sweetish mucilaginous fruits, available for the table (Philippi). C. giganteus (Engelmann), from New Mexico, which attains the stupendous height of 50 feet, with a proportionate columnar thickness, yields also edible fruits, and lives unprotected in our clime. It was introduced by the writer many years ago. C. repandus and C. triangularis

(Haworth) of West India and Mexico, together with several other species, are available in places free of frost as hedge plants.

Ceroxylon andicola, Humboldt.

The Wax Palm of New Granada, ascending the Andes to 11,000 feet. One of the most majestic and at the same time one of the most hardy of all Palms, attaining occasionally a height of 180 feet. The trunk exudes a kind of resinous wax, about 25 lbs. being obtainable at a time from each stem; this by admixture of tallow is used for candles. There are several other Andine palms, which could be reared in our forests or in sheltered positions at our dwellings, but some of them are not even yet phytographically circumscribed.

Ceroxylon australe, Martius.

Juan Fernandez, on the higher mountains (latitude 34° south).

Ceroxylon Klopstockia, Martius.

Venezuela. This very tall Wax Palm reaches elevations of 6,000 feet.

Cervantesia tomentosa, Ruiz and Pavon.

Forest mountains of Peru. This tree yields edible seeds. It is likely to prove hardy in our lower forest regions.

Chærophyllum bulbosum, Linné.

Middle Europe and Western Asia. The Parsnip Chervil. A biennial herb. The root a good culinary esculent.

Chærophyllum sativum, Lamarck. (*Anthriscus Cerefolium,* Hoffmann.)

The Chervil. Middle and South Europe, Western Asia. An annual herb, available for salads and condiments, but the root deleterious.

Chamærops excelsa, Thunberg.

South China as far north as Napong. This Fan Palm is highly desirable, although not tall, as the name would indicate. The hardiest of all palms; has stood 16° Cels. below freezing-point with only a slight litter (Count de Saporta). The hairy covering of the stem of this palm and of Livistona Chinensis are utilised for fixing lime-plaster to buildings in Japan (Christie).

Chamærops Fortunei, Hooker.

North China. The Chusan Palm. It attains a height of about

12 feet, and endures, like the following species considerable frost. The leaves can be employed for plaiting palm hats. Other hardy palms might be naturalised and used for various purposes irrespective of their ornamental features.

Chamærops humilis, Linné.

The Dwarf Fan Palm of South Europe, North Africa, and the most south-western parts of Asia. It is very decorative for gardens and plantations, particularly also eligible for scenic effect.

Chamærops Khasyana, Griffith.

In the Himalayas at elevations from 4,000 to 8,000 feet. Allied to C. Martiana. Also, according to Kurz, in dry pine forests of Martaban and Ava.

Chamærops Martiana, Wallich.

Ascends the mountains of Nepal to 5,000 feet. Attains a height of 50 feet, and is altogether a noble object. Reaches higher altitudes in the Himalayas than any other species.

Chamærops Ritcheana, Griffith.

Arid mountains of Afghanistan; seemingly the only Palm of that country there extensively used for cordage. Has also proved hardy even in England.

Chelidonium majus, Linné.

Europe and Western Asia. The Celandine. A perennial herb of medicinal value. Chemical principles: chelerythrin and chelidonin; also a yellow pigment, chelidoxanthin.

Chenopodium ambrosioides, Linné.

Tropical America. An annual medicinal herb. Chenopodium anthelminthicum seems a perennial variety of this species.

Chenopodium auricomum, Lindley.

From the Darling River to Carpentaria and Arnhem's Land. A tall perennial herb, furnishing a nutritious and palatable spinage. It will live in arid desert regions. Several other species of Chenopodium, among them the European C. bonus Henricus, afford fair spinage, but they are annual.

Chenopodium Blitum, F. v. Mueller. (*Blitum virgatum,* Linné.)

From South Europe to India. An annual herb, extensively

in use there as a cultivated spinach plant. The fruits furnish a red dye. The genus Blitum was reduced to Chenopodium by the writer in Caruel's *Giornale Botanico* some years ago and in 1864 by Dr. Ascherson, who gave to B. virgatum the name Chenopodium foliosum. C. capitatum, Ascherson (*Blitum capitatum*, Linné), may not be really a distinct species. C. Quinoa, Willdenow, from Chili, deserves hardly recommendation for culture, though a nutritious spinach, it being apt to stray as a weed into cultivated fields. Some of these sorts of plants are useful to anglers, as attracting fish, when thrown into rivers or lakes.

Chionanche cyathopoda, F. v. Mueller.

Tropical and Eastern sub-tropical Australia. With C. barbata of India and Queensland a valuable fodder grass.

Chloris truncata, R. Brown.

The Windmill Grass. South-Eastern Australia, as far south as Port Phillip. This perennial and showy grass is regarded by Mr. Walter Bissill as an excellent summer and autumn grass, of ready growth and relished by grazing animals. *C. ventricosa* (R. Br.) is another valuable East Australian species.

Chlorogalum pomeridianum, Kunth.

California, frequent on the mountains. This lily-like plant attains a height of 8 feet. The heavy bulb is covered with many coatings, consisting of fibres, which are used for cushions, mattresses, &c.; large contracts are entered into for the supply of this material on a very extensive scale (Professor Bolander). The inner part of the bulb serves as a substitute for soap, and it might be tried whether it can be utilised for technological purposes like the root of Saponaria, as it contains saponin.

Chloroxylon Swietenia, Candolle.

The Satin Wood. Mountains of India. Like the allied Flindersias, possibly this tree would prove hardy even in cool sheltered places, the cognate Cedrela Taona advancing in East Australia southward to the 35th degree. A resin, valuable for varnishes, exudes from the stem and branches.

Chrysanthemum roseum, Adam. (*Pyrethrum roseum*, Bieb.)

Sub-alpine South-West Asia. This perennial herb, with C. coronopifolium, Willdenow, yields the Persian insect-powder.

Cicer arietinum, Linné.

South Europe and Orient. The Gram or Chick Pea. An

annual herb, valuable as a pulse for grazing animals. An extensive article of human diet in India. Colonel Sykes counted as many as 170 seeds on one plant. In Spain, next to wheat, the most extensively used plant for human food (Honourable Caleb Cushing). The seeds can be converted into pea-meal or be used otherwise for culinary purposes.

Cichorium Endivia, Linné.

South Europe, Orient, Middle Asia. A biennial plant, used since ancient times as a culinary vegetable.

Cichorium Intybus, Linné.

Chicory. A well-known perennial plant, indigenous to Europe, North Africa, and North and West Asia. The roots much used as a substitute for coffee. This plant requires a rich, deep, loamy soil, but fresh manure is detrimental to the value of the root. It is also a good fodder plant, especially for sheep. The root can also be dressed and boiled for culinary purposes. The leaves useful for salad.

Cimicifuga racemosa, Elliott.

The Black Snake Root of North America. A perennial herb of medicinal value, the root possessing emetic properties.

Cinchona Calisaya, Ruiz and Pavon.*

Yellow Peru Bark Tree. Andes of Peru, New Granada, and Bolivia, 5,000 to 6,000 feet above the ocean. This tree attains a height of 40 feet. It yields the Yellow Bark, and also part of the Crown Bark. It is one of the richest yielders of quinin, and produces besides cinchonidin, but yields little of other alkaloids. The most valuable species in Bengal, braving occasional night frost. This has flowered at Berwick already, three years ago, under the care of Mr. G. W. Robinson, from plants supplied by the author, therefore as far south as Port Phillip. It grows under conditions more limited than those of C. succirubra, nor is it so easily propagated. Not all its varieties furnish bark of equal value. The Santa Fé variety ascends the Andes of New Granada up to 10,000 feet and produces the highly valuable soft Columbia Bark.

Cinchona cordifolia, Mutis.*

Peru and New Granada on the Andes, at between 6,000 and 8,000 feet elevation. Provides the hard Cartagena Bark or West Pitaya Bark, one extremely rich in alkaloids. It is a species of robust constitution, grows with rapidity and vigour.

The thickest bark is obtained in the highest altitudes, which by passing clouds are often involved in misty humidity (Cross).

Cinchona micrantha, Ruiz and Pavon.

Cordilleras of Bolivia and Peru. This tree attains a height of 60 feet, and from it part of the Grey and Huanuco Bark, as well as Lima Bark, are obtained. It is comparatively rich in cinchonin and quinidin; contains, however, also quinin.

Cinchona nitida, Ruiz and Pavon.

Andes of Peru and Ecuador. This tree rises to 80 feet under favourable circumstances. It also yields Grey Bark and Huanuco Bark, besides Loxa Bark. It will probably prove one of the hardiest species. It contains predominantly cinchonin and quinidin.

Cinchona officinalis, Linné (partly).* (*Cinchona Condaminea,* Humboldt).

Andes of New Granada and Peru, at a height of 6,000 to 10,000 feet. Yields Crown or Brown Peru Bark, besides part of Loxa Bark. Comparatively rich in quinin and cinchonidin. The temperature of the middle regions of the Andes, where this tree grows, is almost the same as that of the Canary Islands. Superabundance of moisture is particularly pernicious to this species. The Crispilla variety endures a temperature occasionally as low as 27° F.

Cinchona lancifolia (Mutis) is considered by Weddell a variety of C. officinalis. This grows on places where the mean annual temperature is that of Rome, with, however, less extremes of heat and cold. It yields part of the Pitaya Bark.

Cinchona Pitayensis must also be referred to C. officinalis as a variety. This attains a height of 60 feet and furnishes also a portion of the Pitaya Bark. It is this particular cinchona which in Upper India yielded in some instances the unprecedented quantity of 11 per. cent. alkaloids, nearly 6 per cent. quinin, the rest quinidin and cinchonin; this plant is now annihilated for bark purposes in its native forests.

In Java some of the best results were obtained with Cinchona Hasskarliana, Miq., a species seemingly as yet not critically identified.

Cinchona succirubra, Pavon.*

Middle Andine regions of Peru and Ecuador. A tree attaining a height of 40 feet, yielding the Red Peru Bark, rich in quinin and cinchonidin. It is this species which is predominantly

cultivated on the mountains of Bengal. It has been found hardy in Lower Gippsland and the Westernport District. It grew in Madeira at an elevation of 500 feet, after having been planted two and a half years, to a height of 20 feet, flowering freely. All these cinchonas promise to become of importance for culture in the warmest regions of extra-tropical countries, on places not readily accessible or eligible for cereal culture. The Peruvian proverb that cinchona trees like to be "within sight of snow" gives some clue to the conditions under which they thrive best. They delight in the shelter of forests, where there is an equable temperature, no frost, some humidity at all times both in air and soil, where the ground is deep and largely consists of the remnants of decayed vegetable substances, and where the subsoil is open. Drippage from shelter trees too near will be hurtful to the plants. Closed valleys and deep gorges, into which cold air will sink, are also not well adapted for cinchona culture. We ought to consociate the Peru Bark plants with naturally-growing fern trees, but only in the warmest valleys and richest soil. The best temperature for cinchonas is from 53° to 66° F.; but they mostly will endure in open places a minimum of 32° F.; in the brush shades of the Botanic Garden of Melbourne, where years ago cinchonas were already raised by the thousand, they have even resisted uninjured a temperature of a few degrees less, wherever the wind had no access, while under such very slight cover the cinchonas withstood also a heat of a few degrees over 100° F. The plants are most easily raised from seeds, best under some cover such as mats, and they are seeding copiously already several years after planting. The contents of alkaloids in the bark can be much increased by artificial treatment, if the bark is only removed on one side of the stem and the denuded part covered with moss, under which in one year as much bark is formed as otherwise requires three years' growth,—such forced bark, moreover, containing the astounding quantity of as much as 25 per cent. alkaloids, because no loss of these precious substances takes place by gradual disintegration through age. The root bark of some cinchonas has proved to contain as much as 8 per cent. of alkaloids (see Gardeners' Chronicle, 1877, p. 212). The income from Java plantations is considerably over double the cost of the expenses of culture and transit. Mr. Howard's opinion that cinchonas in low land plantations produce a far less quantity of alkaloids needs further confirmation, particularly regarding the valuable quinin and cinchonidin. The cinchona plants are set out at distances of about 6 feet. The harvest of bark begins in the fourth or fifth year. The price varies in Europe from 2*s.* to

9*s*. per lb., according to quality. The limits assigned to this literary compilation do not admit of entering further into details on this occasion, but I may add that in the Darjeeling district over three millions of cinchona plants were in cultivation already in 1869, raised in Government plantations. Cultivation of cinchonas for commercial purposes was first initiated in Java through Dr. Hasskarl in 1851. The British harvest in the Madras Presidency alone amounted to 150,000 lbs. in 1875. Dr. King reports in 1877 that 2½ million trees of Cinchona succirubra are now under his control in India. This has proved the hardiest species; it grows under a wide range of conditions, and it seeds freely; thus it is the most valuable cinchona in the elevations of Sikkim. All its varieties produce bark of great value. The total amount of alkaloids is at an average 4 per cent. If the trees were cut every seven or eight years, and simultaneous replanting should take place, Dr. King could keep up an annual supply of 366,000 lbs. of bark.

Cinna arundinacea, Linné.

North America. There recorded as a good fodder grass; perennial, somewhat sweet-scented. Blyttia suaveolens (Fries) is, according to Dr. Asa Gray, a variety with pendant flowers.

Cinnamomum Camphora, Fr. Nees.*

The Camphor Tree of China and Japan north to Kinsin, attaining a height of about 40 feet. It endures the occasional frosts of a clime like that of Port Phillip, though the foliage will suffer. The wood, like all other parts of the tree, is pervaded by camphor; hence resists the attacks of insects. The well-known camphor is obtained by distilling or boiling the chopped wood and root; the subsequently condensed camphoric mass is subjected to a purifying sublimation process.

Cinnamomum Cassia, Blume.

South China. It is not impossible that this tree, which produces the Chinese cinnamon or the so-called Cassia lignea, may prove hardy outside the tropics. Sir Joseph Hooker found in the Khasya mountains up to 6,000 feet three cinnamons producing this Cassia bark,—namely, C. obtusifolium, C. pauciflorum, and C. Tamala, the latter extending to Queensland. Dr. Thwaites notes the true Cinnamon tree (C. Zeilanicum, Breyn) even up to 8,000 feet in Ceylon, but the most aromatic bark comes from lower altitudes. Cinnamon leaves yield a fragrant oil, and the root camphor.

Cistus creticus, Linné.

Countries on the Mediterranean Sea. This shrub, with C. cyprius (Lam.) furnishes the best ladanum resin. Other species yield a less fragrant product.

Citrus Aurantium, Linné.*

The Orange (in the widest sense of the word). A native of South Asia. A tree of longevity, known to have attained the age of 600 years or more. Any specific differences, to distinguish C. Aurantium from C. Medica, if they once existed, are obliterated now through hybridisation, at least in the cultivated forms. In Central India a peculiar variety is under culture, producing two crops a year. The blossoms of February and March yield their ripe fruit in November and December, whereas from the flowers of July mature fruits are obtained in March and April. To prevent exhaustion only alternate fruiting is allowed. As prominent varieties of C. Aurantium may be distinguished :—

Citrus Bergamium, Risso. From the fruit-rind of this variety Bergamotte oil is obtained, but also oil from the flowers. The Mellarosa variety furnishes a superior oil and exquisite confitures.

Citrus Bigaradia, Duhamel. The Bitter Orange. This furnishes from its flowers the Neroli oil, so delicious and costly as a scent. It is stated that orange flowers to the value of £50 might be gathered from the plants of an acre within a year. The rind of the fruit is used for candied orange peel. Bitter principle : hesperidin in the rind, limonin in the seed.

Citrus decumana, Linné. The Shaddock or Pompelmos. The fruit will exceptionally attain a weight of 20 lbs. The pulp and thick rind can both be used for preserves.

Citrus dulcis, Volkamer. The Sweet Orange, of which many kinds occur. The St. Michael Orange has been known to bear in the Azores on sheltered places 20,000 fruits on one tree in a year. Neroli oil is obtained from the flowers of this and allied varieties. The oil of orange-peels might be used as a cheap and pleasant one for distilling with it costly odorous substances.

Citrus nobilis, Loureiro. The Mandarin Orange. The thin peel separates most readily from the deliciously-flavoured sweet pulp. There are large and small fruited Mandarin oranges; the Tangerine variety is one of them. Some varieties are excellent for hedges, and as such are much used in Japan. Burnt earth is valuable as an admixture to soil in orangeries.

Citrus Australasica, F. v. Mueller.

Coast forests of extra-tropical East Australia. A shrubby

species, with oblong or almost cylindrical fruits of lemon-like taste, measuring 2 to 4 inches in length. They are thus very much larger than those of Atalantia glauca of the coast and the desert interior of tropic Australia, which are also of similar taste. These plants are entered, together with the following on this list, merely to draw attention to them as likely capable of improvement of their fruit through culture.

Citrus Japonica, Thunberg.

The Kumquat of Japan. A shrubby Citrus with fruits of the size of a gooseberry, from which on account of their sweet peel and acid pulp an excellent preserve can be prepared.

Citrus Medica, Linné.*

The Citron (in the widest sense of the word). Indigenous to Southern Asia. For the sake of convenience it is placed here as distinct from C. Aurantium. As prominent varieties of the Citrus Medica may be distinguished:—

Citrus Cedra, Gallesio. The real Citron. From the acid tubercular *fruit essential oil and citric acid can be obtained,* irrespective of the ordinary culinary use of the fruit. A large variety with thick rind furnishes candied the citrionate or succade. The Cedra oil comes from a particular variety.

Citrus Limonium, Risso. The Real Lemon. From the fruit of this is largely pressed the lemon juice, while the thin, smooth, aromatic peel serves for the production of volatile oil or for condiments. The juice of this fruit is particularly rich in citric acid. A large variety is the Rosaline Lemon.

Citrus Limetta, Risso. The real Lime. The best lime-juice is obtained from this variety, of which the Perette constitutes a form.

Citrus Lumia, Risso. The Sweet Lemon, including the Pear Lemon with large pear-shaped fruit. Rind thick and pale; pulp not acid. This variety serves for particular condiments.

Citrus Planchoni, F. v. Mueller. (*C. Australis,* Planchon, partly.)

Forests near the coast of sub-tropic East Australia. A noble tree, fully 40 feet high, or, according to Hartmann, even 60 feet high, with globular fruits about the size of a walnut, called in Australia Native Oranges. The species has first appeared under the above name in the "Report on the Vegetable Products of the Intercolonial Exhibition of 1867." Its beautiful wood takes a high polish; hence it is made use of for the finest cabinet-work.

Cladrastis tinctoria, Rafinesque.

North America. The wood of this tree produces a saffron-yellow dye.

Clavaria botrytis, Persoon.

Europe. This and the following are the species, which are admitted for sale among Silesian mushrooms, according to Dr. Goeppert: *C. brevipes* (Krombholz), *C. flava*, *C. formosa*, *C. grisea* (Persoon), *C. muscoides* (L.), *C. aurea* (Schaeffer), *C. palmata* (Scop.), *C. crispa* (Wulfen).

Coccoloba uvifera, Jacquin.

Central America, northward to Florida. A tree, attaining a large size, fit for sandy sea-shores. The dark-blue, sweet or acidulous berries are edible. A kind of kino is obtained from the bark; the wood yields a red dye. Dr. Rosenthal notes as yielding likewise edible fruits—*C. nivea* (Jacq.), *C. pubescens* (L.), *C. excoriata* (L.), *C. flavescens* (Jacq.), *C. diversifolia* (Jacq.). *C. Leoganensis* is also a coast tree; other species belong to forest regions of mountains.

Cochlearia Armoracia, Linné.

The Horse-radish. Middle Europe and Western Asia. Perennial. The volatile oil of the root allied to that of mustard.

Cochlearia officinalis, Linné.

Shores of Middle and North Europe, North Asia, and North America. A biennial herb, like the allied C. Anglica and C. Danica, valuable as an antiscorbutic; hence deserving naturalisation. It contains a peculiar volatile oil.

Cocos Australis, Martius.

From Brazil to Uruguay and the La Plata States. One of the hardiest of all Palms, hardier even than the Date Palm, withstanding unprotected a cold of 8° C. below freezing point, at which temperature oranges and almonds are injured or destroyed.

Cocos flexuosa, Martius.

Brazil, extending far south. This slender and not tall decorative Palm belongs to the dry Cactus region with C. coronata, C. capitata, Astrocaryum campestre, Diplothemium campestre, and Acrocornea sclerocarpa (Martius).

Cocos regia, Liebmann.

Mexico, up to 2,500 feet. A Palm of enormous height, almost sure to prove hardy here.

Cocos Romanzoffiana, Chamisso.

Extra-tropic Brazil. This noble Palm attains to a height of 40 feet.

Cocos Yatay, Martius.*

Rio Grande do Sul, Uruguay, and Argentina. Forms mainly, with *C. Australis* and *C. Datil*, distinct forests (Drude). The last mentioned bears date-like fruits, according to Dr. Lorentz.

Coffea Arabica, Linné.

Mountains of South-West Abyssinia. The Coffee Plant. This shrub or small tree has been admitted into this list, not without great hesitation, merely not to be passed. The cultivation within extra-tropical boundaries can only with any prospect of success be tried in the warmest and simultaneously moistest regions, frost being detrimental to the coffee plant. In Ceylon the coffee regions are between 1,000 and 5,000 feet above the ocean, but Dr. Thwaites observes that the plant succeeds best at an elevation from 3,000 to 4,500 feet, in places where there is a rainfall of about 100 inches a year. The temperature there rises hardly ever above 80° F., and almost never sinks below 45° F. Coffee requires moist weather whilst it ripens its fruit, and a season of drier weather to form its wood. For further particulars see the papers of the Planters' Association of Kandy. Chemical principles: coffein, a peculiar tannic acid and quinic acid. The loss sustained in 1878 alone by the ravages of parasitic fungus growth on coffee plants in Ceylon amounted to £2,000,000, the total loss since 1869 from this source to £15,000,000 (Abbay). In America, coffee plantations have suffered not only from the attacks of erysiphoid fungi, but also the Cemiostoma Fly. The Liberian Coffee (*C. Liberica*, Bull) has shown immunity from the latter insect (Dr. Imray). Coffee leaves have recently come into use as tea.

Coffea Liberica, Bull.

The Liberian Coffee plant, distinguished already by Afzelius. Requires greater heat than the ordinary coffee; less affected by the Hemileia mould; berries larger; flavour superior; productiveness greater.

Colchicum auctumnale, Linné.

Middle and South Europe, West Asia. The Meadow Saffron. The seeds and roots of this pretty bulbous-tuberous herb are important for medicinal use. The plant has been introduced

into Australia by the writer with a view of being naturalised on moist meadows in our ranges. Active principle : colchicin.

Colocasia antiquorum, Schott.

From Egypt through South Asia to the South Sea Islands; apparently also indigenous in the warmer parts of East Australia. The Taro. The stem-like, tuberous, starchy roots lose their acridity by the process of boiling, roasting, or baking. It is the Kolkas of the Arabs and Egyptians, to them one of the most esteemed and abundant vegetables. Immense quantities are harvested and kept during the winter. The plant proved hardy as far south as Melbourne. Cultivated as far south as New Zealand. The tops of the tubers are replanted for a new crop. Taro requires a rich moist soil and would grow well on banks of rivers. For scenic culture it is a very decorative plant. Colocasia esculenta is a variety of this species.

Colocasia Indica, Kunth. (*Alocasia Indica,* Schott.)

South Asia, South Sea Islands, and East Australia. Cultivated for its stem and tubers on swamps or rivulets. This stately plant will rise in favourable localities to a height of 12 feet, the edible trunk attaining a considerable thickness, the leaves sometimes measuring 3 feet in length. In using the stem and root for food, great care is needed to expel by the heating process all acridity. Colocasia odora and C. macrorrhiza seem varieties of this species. Several other aroid plants deserve attention for test-culture on account of their edible roots, among them Cyrtosperma edule, Seemann, from the Fiji Islands.

Combretum butyraceum, Caruel.

The Butter Tree of Caffraria and other parts of South-East Africa. The Caffirs call the fatty substance obtained from this tree Chiquito. It is largely used by them as an admixture to their food, and exported also. It contains about one-quarter olein and three-quarters margarin. This butter-like fat is extracted from the fruit, and is of an aromatic flavour. The tree should be hardy in the warmer and milder parts of Victoria.

Comptonia asplenifolia, Solander.

North America. The Sweet Fernbush. This dwarf shrub is perhaps quite worthy of dissemination on sterile hills, as the foliage contains nearly 10 per cent. of tannin, an extract of which has come into the tanning trade.

Condalia microphylla, Cavanilles.

Chili and Argentina. The Piquillin. Bush yielding sweet, edible, succulent fruit.

Conium maculatum, Linné.

The Hemlock. Europe, North Africa, North and West Asia. A biennial herb, important for medicinal purposes. It should, however, not be allowed to stray from its plantations, as it is apt to be confounded with culinary species of Anthriscus, Chærophyllum and Myrrhis, and may thus cause, as a most dangerous plant, disastrous mistakes. Active principles: coniin, in the fruit also conhydrin.

Conopodium denudatum, Koch.

Western Europe. The small tuberous roots of this herb, when boiled or roasted, are available for food and known as Earth Chestnuts. The plant is allied to Carum Bulbocastanum.

Conospermum Stœchadis, Endlicher.

West Australia. The question has arisen, whether this shrub, with *C. triplinervium* (R. Brown), ought not to be introduced into our worst desert country. All kinds of pasture animals browse with avidity on the long, tender, and downy flower stalks and spikes without touching the foliage, thus not destroying the plant by close cropping.

Convolvulus floridus, Linné fil.

Canary Islands. A shrubby, not climbing or winding species. With C. scoparius it yields the Atlantic Rosewood from stem and root.

Convolvulus Scammonia, Linné.

Mediterranean regions and Asia Minor. A perennial herb, from the root, which will grow 2 feet long, is obtained the purgative resin Scammonia. Plants readily raised from seeds. To obtain the resin a portion of the root is laid bare and into incisions made shells are inserted to collect the juice, which is daily removed (Maw).

Convolvulus scoparius, Linné fil.

Teneriffe. One of the Rosewood plants.

Copernicia cerifera, Martius.

Brazil, extending into Bolivia and also Argentina. This

magnificent Fan Palm, like so many others of this noble Order, may prove hardy in extra-tropical latitudes. It resists drought in a remarkable degree, and prospers also on a somewhat saline soil. The stem furnishes starch; the sap yields sugar; the fibres of the leaves are converted into ropes, which resist decay in water: it can also be used for mats, hats, baskets and brooms, and many other articles are prepared from the leaves. The inner part of the leaf-stalks serves as a substitute for cork. Mainly, however, this palm is valued for its Carnauba wax, with which the young leaves are coated, and which can be detached by shaking; it is harder than bees'-wax and is used in candle manufacture. Each tree furnishes about 4 lbs. annually. In 1862 no less than 2,500,000 lbs. were imported into Great Britain, realising about £100,000.

Corchorus acutangulus, Lamarck.

Tropical Africa, South Asia, and North Australia. This species is specially mentioned by some writers as a jute plant. A particular machine has been constructed by Mr. Le Franc, of New Orleans, for separating the jute fibre. With it a ton of fibre is produced in a day by four men's work, and it leaves no butts or refuse. This apparatus can also be used for other fibre plants. The seeds of the Corchorus, which spontaneously drop, will reiterate the crop.

Corchorus capsularis, Linné.*

From India to Japan. One of the principal jute plants. An annual, attaining a height of about a dozen feet, when closely grown, with almost branchless stem. A nearly allied but lower plant, Corchorus Cunninghami, F. v. Mueller, occurs in tropical and sub-tropical East Australia. Jute can be grown where cotton and rice ripen, be it even in localities comparatively cold in the winter, if the summer's warmth is long and continuous. The fibre is separated by steeping the full-grown plant in water from five to eight days, and it is largely used for rice, wool and cotton bags, carpets and other similar textile fabrics, and also for ropes. About 60,000 tons are annually exported from India to England, and a large quantity also to the United States. Jute is sown on good land, well ploughed and drained, but requires no irrigation, although it likes humidity. The crop is obtained in the course of four or five months, and is ripe when the flowers turn into fruit capsules. Good paper is made from the refuse of the fibre. Jute has been found, when planted around cotton fields, to protect them, like hemp, from caterpillars (Hon. T. Watts). In India jute alternates with rice or sugarcane; as a crop it

wants damp soil: the harvest is in three, four, or five months. Unlike cotton it will bear a slight frost. Under favourable circumstances 2,000 to 7,000 lbs. may be obtained from an acre. It is best grown on flooded ground, as otherwise it proves an exhaustive crop. Two hundred million pounds of jute were woven in 1876 in Dundee, and 50 million gunny bags were exported from Britain in one single year, according to S. Waterhouse. Jute does not so easily decay when exposed to moisture as hemp.

Corchorus olitorius, *Linné.**

South Asia and North Australia. Furnishes, with the foregoing species, the principal supply of jute fibre. As it also is an annual, it can be brought to perfection in the summers of the warm temperate zone. The foliage can be used for spinach. The fibre is not so strong as hemp, but very easily prepared. It will not endure exposure to water. The allied Corchorus trilocularis, L., of Indian origin, is likewise a native of eastern tropical and sub-tropical Australia.

Cordyline Banksii, J. Hooker.

New Zealand. This lax and long-leaved Palm-Lily attains a height of 10 feet; its stem is usually undivided. This and the following species have been admitted into this list for a double reason, because not only are they by far the hardiest, quickest growing and largest of the genus, and thus most sought in horticultural trade for scenic planting, but also because they furnish from the leaves a superior fibre for ropes and other textile purposes. The small seeds are produced in great abundance, and germinate with extreme readiness. These Palm-Lilies ought to be naturalised in forest ranges by mere dissemination.

Cordyline Baueri, J. Hooker. (*C. Australis,* Endlicher, *not* J. Hooker.)

Norfolk Island. The stem of this stately species attains a height of 40 feet, and becomes in age ramified. It is very intimately allied to the following species.

Cordyline indivisa, Kunth.

New Zealand. The stem of this thick and rigid-leaved palm-like species rises to a height of 20 feet, and remains undivided. Leaves finally 5 inches broad; yield the toi fibre. Aged leaves persistent in a perfectly downward position for many years. Panicle at first erect. Berries white.

Cordyline superbiens, C. Koch. (*C. Australis,* J. Hooker, *not* Endlicher.)

New Zealand. The stem of this noble thin-leaved plant attains a height of 40 feet, and is branched. Aged leaves readily separable; berries blue. Hardy at Torquay (W. Wood), Power's Court, Limerick, and in others of the milder localities in South England and Ireland.

Cordyline terminalis, Kunth.

South Asia, Polynesia, East Australia. The roots in a roasted state are edible. The leaves, like those of other species, can be utilised for textile fibre. The splendid decorative Cordylines with red or variegated foliage belong to this species.

Coriandrum sativum, Linné.

Orient and Middle Asia. An annual or biennial herb, much in use for condiments. The essential oil peculiar.

Corylus Colurna, Linné.

The Constantinople Nut Tree, the tallest of Hazels, attaining 60 feet in height, of rather quick growth. This, as well as the European Hazel (*Corylus Avellana,* L.) and the Japan Hazel (*C. heterophylla,* Fischer), might be grown for copses in forest gullies for their filberts.

Corynocarpus lævigata, Forster.

The Karaka of New Zealand and the principal forest tree of the Chatham Islands, attaining a height of 60 feet. The wood is light, and used by the natives for canoes. The pulp of the fruit is edible. Cattle browse on the foliage. In rich irrigated soil the tree can be adopted for very shady avenues.

Corynosicyos edulis. (*Cladosicyos edulis,* J. Hooker.)

Guinea. A new cucumber-like plant, with edible fruits about 1 foot long and 3 inches in diameter.

Crambe cordifolia, Steven.

From Persia and the Caucasus to Thibet and the Himalayas up to 14,000 feet. The root and foliage of this Kale afford an esculent. C. Kotschyana (Boiss.) is an allied plant.

Crambe maritima, Linné.

Sea Kale. Sand-coasts of Europe and North Africa. A perennial herb; the young shoots used as a wholesome and agreeable vegetable. Should be naturalised.

Crambe Tataria, Wulfen.

From Southern Europe to the Orient. Perennial. Likewise used for culinary purposes. According to Simmonds the large fleshy roots form also an esculent.

Cratægus æstivalis, Torrey and Grey.

The Apple Haw. Southern States of North America. The small juicy fruit of an agreeable acid taste.

Cratægus apiifolia, Michaux.

North America. Highly serviceable for hedges.

Cratægus Azarolus, Linné.

Welsh Medlar. South Europe and South-West Asia. The pleasantly acidulous fruits are much used for preserves.

Cratægus coccinea, Linné.

North American White Thorn. A valuable hedge plant; also very handsome. Spines strong.

Cratægus cordata, Aiton.

Southern States of North America. Also much employed for hedges.

Cratægus Crus-Galli, Linné.

North America. The Cockspur Thorn. Regarded as one of the best species for hedges. Spines long and stout.

Cratægus Oxyacantha, Linné.

Europe, North Africa, North and West Asia. The ordinary Hawthorn or White Thorn. Recorded here as one of the most eligible among deciduous hedge plants; the wood is considered one of the best substitutes for boxwood by engravers.

Cratægus parvifolia, Aiton.

North America. For dwarf hedges. Spines long, slender, sharp and numerous.

Cratægus pyracantha, Persoon.

The Firethorn. South Europe. This species is evergreen. It is likewise adapted for hedges, but slower in growth than hawthorn, although not difficult to rear.

Cratægus tomentosa, Linné.

North America, up to 20 feet high. Fruit edible. By the species mentioned the list of American hedgethorns is probably not yet exhausted.

Crithmum maritimum, Linné.

The real Samphire. Sea-shores of Middle and South Europe, North Africa and the Orient. A perennial herb. Settlers on the coast might readily disseminate and naturalise it. It is held to be one of the best plants for pickles, the young leaves being selected for that purpose.

Crocus sativus, Linné.

The Dye Saffron. South Europe and Orient. The stigmata of this particular autumnal flowering crocus constitute the costly dye substance. The best is collected from the flowers just as they daily open in succession. At any early stage of colonisation it would not be remunerative to grow saffron commercially; but as the plant is well adapted for many extra-tropical countries or for high elevations within the tropical clime, it might be planted out into various unoccupied mountain localities with a final view to naturalise it, and to render it thus available at a later period from native sources.

Crocus serotinus, Salisbury. (*C. odorus,* Bivona.)

South Europe. This species also produces saffron rich in pigment. The bulbs of several are edible.

Crotalaria Burhia, Hamilton.

Beluchistan, Affghanistan, Scinde. This perennial herb grows in arid places and yields, like the following, Sunn fibre.

Crotalaria juncea, Linné.

The Sunn hemp. Indigenous to South Asia, and also widely dispersed through tropical Australia. An annual herb, rising under favourable circumstances to a height of 10 feet. In the colony of Victoria, Sunn can only be cultivated in the warmest and moistest localities. It comes in four or five months to maturity. The plant can also be grown as a fodder herb for cattle. It requires rich, friable soil. If a superior soft fibre is desired, then the plant is pulled while in flower; if strength is the object, then the plant is left standing until it has almost ripened its seeds. The steeping process occupies about three days. For the purpose of obtaining branchless stems it is sown

closely. Cultivated in the Circars according to Roxburgh to feed milch cows.

Crotalaria retusa, Linné.

Asia, America, and Australia within the tropics. A perennial herb. Its fibre resembles that of C. juncea, and is chiefly used for ropes and canvas. Others of the multitudinous species of Crotalaria deserve to be tested for their fibres.

Croton lacciferus, Linné.

Ceylon, up to 3,000 feet. Suitable for the warmer forest regions here, to obtain from this tree its peculiar exuding lac resin.

Crozophora tinctoria, Necker.

South Europe, North Africa, and Orient. An annual herb. The turnsole dye is prepared by exposure of the juice to the air, or by treating it with ammonia.

Cryptomeria Japonica, Don.

Japan and Northern China. The Sugi; the largest tree in Japan, the trunk attaining 35 feet in circumference (Rein); it is also grown for hedges and there yielding the most esteemed timber, scented like that of Cedrela (Christie). A slender evergreen tree, sometimes over 100 feet high. It requires forest valleys for successful growth. The wood is compact, very white, soft and easy to work. In the Azores preferred even to the *Pinus Haleppensis* for timber culture, on account of its still more rapid growth in that insular clime.

Cucumis cicatrisatus, Stocks.

Scinde, where it is called "Wungee." The edible ovate fruit is about 6 inches long.

Cucumis Citrullus, Seringe. (*Citrullus vulgaris,* Schrader.)

Mediterranean regions. The Water Melon. It is simply mentioned here to indicate the desirability of naturalising it in the Australian interior deserts, where no Cucurbita and only a single kind of edible Cucumis (C. acidus, Jacquin), with fruits not larger than a pigeon's egg, is indigenous. In South African deserts it has become spontaneously established, and retained the characters of the cultivated fruit.

Cucumis Colocynthis, Linné. (*Citrullus Colocynthis,* Schrader.)

From the Mediterranean regions to India. An annual herb.

The medicinal extract of colocynth is prepared from the small gourd of this species. Active principle: colocynthin.

Cucumis Conomon, Thunberg.

Japan. An annual. The large fruit is used for preserves.

Cucumis Melo, Linné.

The Melon. Originally from the country about the Caspian Sea. The best varieties might also be naturalised in sand deserts, particularly in places where some moisture collects. Some of the Bokhara varieties are remarkably luscious and large. Apparently remunerative results have been gained in B[illegible] experiments to cultivate melons for sugar and treacle. The seeds thus obtained in quantıy, become available for oil pressing. The root contains melonemetin.

Cucumis Momordica, Roxburgh.

Cultivated in India. It produces cucumbers 2 feet long, bursting slowly when ripe into several divisions. Young, the fruit is used like cucumbers; aged, like melons.

Cucumis sativus, Linné.

The Cucumber. Egypt. Indicated here merely for completeness' sake, also because gherkin pickling ought to become a more extended local industry. Dr. G. King brought under notice and culture the Chinese cucumber "Solly-Qua," which attains a length of 7 feet. It must be trained on walls or trellises, to afford to the fruit sufficient scope for suspension.

Cucumis utilissimus, Roxburgh.

Mountains of Bengal. An annual like the other species. Fruit of the size and shape of an ostrich's egg, with the flavour of melons. These fruits will keep for several months.

Cucurbita maxima, Duchesne.

Large Gourd. Turkey. Instances are on record of fruits having weighed over 2 cwt. This species, also, is eligible for naturalisation in the interior. Amongst other purposes it serves for calabashes.

Cucurbita Melopepo, Linné.

The Squash. May be regarded as a variety of C. Pepo. It will endure storage for months.

Cucurbita moschata, Duchesne.

The Musky Gourd. Doubtless also from the Orient.

Cucurbita Pepo, Linné.

The Pumpkin and Vegetable Marrow. Countries on the Caspian Sea. Its naturalisation in the desert would be a boon. The seeds on pressure yield a fixed oil; they are also anthelminthic. C. melanosperma, A. Braun, is not edible.

Cudrania Javensis, Trecul.

New South Wales and Queensland, South and East Asia to Japan, East Africa. This climbing thorny shrub can be utilised for hedges. Fruit edible, of pleasant taste; the root furnishes a yellow dye.

Cuminum Cymimum, Linné.

North Africa. The fruits of this annual herb are known as Cumin and used for certain condiments, as also in medicine. Cuminum Hispanicum, Merat, is similar. Essential oil peculiar.

Cupressus Benthami, Endlicher.

Mexico, at 5,000 to 7,000 feet. A beautiful tree 60 feet high. The wood is fine-grained and exceedingly durable.

Cupressus Lawsoniana, Murray. (*Chamæcyparis Lawsoniana,* Parl.)

Northern California. This is a splendid red-flowered Cypress, growing 100 feet high, with a stem of 2 feet in diameter, and furnishes a valuable timber for building purposes, being clear and easily worked.

Cupressus Lindleyi, Klotzsch.

On the mountains of Mexico. A stately Cypress up to 120 feet high. It supplies an excellent timber.

Cupressus macrocarpa, Hartweg. (*C. Lambertiana,* Gordon.)

California, from Monterey to Noyo, in the granite as well as sandstone formation; sometimes in Sphagnum-moors. This beautiful and shady tree attains the height of 150 feet, with a stem of 9 feet in circumference, and is one of the quickest growing of all conifers, even in poor, dry soil. One of the best shelter trees on sea-sands, naturally following the coast-line, never extending many miles from the shore, and

occurring in localities where the temperature does not rise above 80° F., nor sinks below the freezing point (Bolander). Richer in its yield of tar than the Scotch Fir, according to American writers.

Cupressus Nutkaensis, Lamb. (*Chamæcyparis Nutkaensis,* Spach.)

The Yellow Cedar or Cypress of Alaska and the neighbouring States. Height of tree, 100 feet. Timber hard, durable, tough and close; also scented; worked with ease; used for boat-building and other purposes; the bast for mats and ropes Can be trimmed for hedge growth.

Cupressus obtusa, F. v. Mueller. (*Retinospora obtusa,* Sieb. and Zucc.)

The Hinoki of Japan. Attains a height of 80 feet; stem 5 feet in circumference. It forms a great part of the forests at Nipon. The wood is white-veined and compact, assuming, when planed, a silky lustre. According to Mr. Christie, durable, close-grained, and easily worked. It is used in Japan for temples. There are varieties of this species with foliage of a golden and of a silvery white hue. Hardy at New York, even in exposed localities. One of the finest of evergreen trees for dwellings. It resembles C. Lawsoniana, but excels it; hardier and of rapid growth (Rev. H. W. Beecher).

Two other Japanese Cypresses deserve introduction,—namely, C. breviramis (*Chamæcyparis breviramea,* Maxim.) and C. pendens (*Chamæcyparis pendula,* Maxim.).

Cupressus pisifera, F. v. Mueller. (*Chamæcyparis pisifera,* Sieb. and Zucc.)

Japan. It attains a height of 30 feet, producing also a variety with golden foliage. Very hardy like the foregoing; also of beautiful aspect and quick growth. Stem occasionally 3 feet in diameter (Rein).

Cupressus sempervirens, Linné.

Common Cypress of South Europe. Height of tree up to 80 feet. It is famous for the great age it reaches, and for the durability of its timber, which is next to imperishable. At present it is much sought for the manufacture of musical instruments.

Cupressus thurifera, Humboldt, Bonpland, and Kunth.

Mexican White Cedar; 3,000 to 4,500 feet above sea level. A handsome pyramidal tree, upwards of 40 feet high.

Cupressus thuyoides, Linné. (*Chamæcyparis sphæroidea*, Spach.)
White Cedar of North America; in moist and morassy ground. Height of tree 80 feet; diameter of stem 3 feet. The wood is light, soft, and fragrant; it turns red when exposed to the air; it is extensively used for a great variety of purposes, particularly also shingles; it is fine-grained and easily worked. The aged wood resists the succession of dryness and moisture better than any other Cypress hitherto tried.

Cupressus torulosa, Don.*
Nepal Cypress. Northern India; 4,500 to 8,000 feet above sea level. Average ordinary height 40 feet, but much larger dimensions are on record, requiring perhaps confirmation. The reddish fragrant wood is as durable as that of the Deodar Cedar, highly valued for furniture. The tree seems to prefer limestone soil. Dr. Brandis thinks that it may attain an age of 1,000 years.

Cyamopsis psoraloides, Candolle.
South Asia. This annual is mentioned by Dr. Forbes Watson among the plants which furnish all the year green table-beans to a portion of the population of India.

Cycas Normanbyana, F. v. Mueller.
A noble Queensland species, deserving introduction, and capable of being shipped to long distances in an upgrown state without emballage.

Cycas revoluta, Thunberg.
The Japan Fern Palm. The trunk attains, in age, a height of about 6 feet, and is rich in sago-like starch. The slow growth of this plant renders it valuable for no other purpose than scenic decorative culture; it endures the climate of Melbourne without protection. Cycas angulata, R. Br., may also prove hardy, and would prove a noble horticultural acquisition, as it is the most gigantic of all Cycadeæ, attaining a height of 70 feet in tropical East Australia. Like the Zamia stems, also, the trunks of Cycas admit of translocation, even at an advanced age.

Cymopterus glomeratus, Candolle.
Western States of North America. Root edible (Dr. Rosenthal).

Cynara Cardunculus, Linné.

The Cardoon. Mediterranean regions. A perennial herb. The bleached leaf stalks serve as esculents.

Cynara Scolymus, Linné.

The Artichoke. South Europe and North Africa. The receptacles and the base of the flower-scales well known as a vegetable. The plant is perennial and here merely mentioned as entitled to extended culture in grouping this with other stately plants. Several other species are worthy of cultivation. The Italian Artichokes are much grown under olive trees to utilise spare ground.

Cynodon Dactylon, Persoon.*

Widely dispersed over the warmer parts of the globe, thus as indigenous reaching the northern parts of the colony of Victoria; stretching also into Middle Europe and West England. Passes under the names of Bermuda Grass, Scutch Grass, Doorva Grass. An important grass for covering bare, barren land, or binding drift-sand, or keeping together the soil of abrupt declivities, or consolidating earth banks against floods. It is not without value as a pasture grass; resists extreme drought, and may become of great importance to many desert tracts. The dispersion is best effected by the creeping rooting stems, cut into short pieces; each of these takes root readily. In arable land this grass, when once established, cannot easily be subdued. The stems and roots are used in Italy for preparing there the Mellago graminis. Roxburgh already declared this grass to be by far the most common and useful of India; that it flowers all the year, and that it forms three-fourths of the food of the cows and horses there. Excellent also as a lawn grass.

Cynosurus cristatus, Linné.

The Crested Dog's-tail Grass. Europe, North Africa, West Asia. A perennial grass, particularly valuable as withstanding drought, the roots penetrating to considerable depth. The stems can also be used for bonnet-plaiting. Though inferior in value for hay, this grass is well adapted for permanent pasture, as it forms dense tufts without suffocating other grasses or fodder herbs.

Cyperus corymbosus, Rottboell.

India. This stately perennial species may be chosen to fringe our lakes and ponds. It is extensively used for mats in India.

Cyperus esculentus, Linné.

South Europe, West Asia, various parts of Africa. Produces the "Chufa" or Ground Almond, an edible root, which contains 27 per cent. of starch, 17 per cent. of oil, and 12 per cent. of saccharine substance; other (French) analyses give 28 per cent. oil, 29 starch, 14 sugar, 7 gum, 14 cellulose. This plant does not spread like the C. rotundus, and can be reared on sand-land, though in rich loose soil the harvest is far more plentiful. The tubers, of which 100 to 150 can be obtained from each plant, are consumed either raw or cooked. Hogs root them up for food. The oil surpasses in excellence of taste all other oils used for culinary purposes. The roasted tubers are a fair substitute for coffee when properly planted; the root crop is available in from 4 to 6 months. The root of the North American C. phymatodes (Muehlenberg) is also nutty.

Cyperus Papyrus, Linné.

The Nile Papyrus, wild in various regions of Africa. Attains a height of 16 feet. Though no longer strictly an utilitarian plant, as in ancient times, it could scarcely be passed on this occasion, as it ought to become valuable in the horticultural trade. Its grand aspect recommends it as very decorative for aquatic plantations.

Cyperus proliferus, Linné fil.

Canary Islands. The "Tagasaste." This tall herb is recommended as a fodder plant in countries exposed to drought.

Cyperus Syriacus, Parlatore.

The Syrian or Sicilian Papyrus. This is the Papyrus plant usual in garden cultivation. The plants in the Melbourne Botanic Garden attain a height of 8 feet, but suffer somewhat from frost. Other tall decorative Cyperi deserve introduction,—for instance, C. giganteus, Rottboell, from West India and Guiana, these kinds of plants being hardier than others from the tropics.

Cyperus tegetum, Roxburgh.

India. This Galingale Rush might be naturalised on river banks, to obtain material for the superior mats made of it in Bengal. The fresh stems are slit longitudinally into three or four pieces, each of which curls round by exsiccation, and can then be worked into durable and elegant mats.

Cyperus textilis, Thunberg. (*Cyperus vaginatus,* R. Brown.)

Widely dispersed over the Australian continent, also occurring in Southern Africa. It is restricted to swampy localities, and thus is not likely to stray into ordinary fields. In the colony of Victoria it is the best indigenous fibre plant, and it is likewise valuable as being with ease converted into pulp for good writing paper, as shown by me some years ago. Its perennial growth allows of regular annual cutting. Within Victorian territory this Galingale rush is particularly common on the Murray flats. The natives there use this as well as Carex tereticaulis (F. v. M.) for nets.

Cytisus scoparius, Link. (*Spartium scoparium,* Linné.)

The Broom Bush. Europe, North Asia. Of less significance as a broom plant than as one of medicinal value. It can also be used for tanning purposes. Most valuable for arresting drift sand. An alkaloid (spartein) and a yellow dye (scoparin) are obtainable from this Broom bush.

Dacrydium Colensoi, Hooker.

New Zealand. A beautiful tree, growing 50 feet in height and producing hard and incorruptible timber; chiefly eligible for our Alpine regions.

Dacrydium cupressinum, Solander.

New Zealand. Native name, Rima; the Red Pine of the colonists. This stately tree attains the height of 200 feet, and furnishes a hard and valuable wood, very lasting for fences but readily decaying in water-works. Professor Kirk recommends the timber on account of its great strength for girders and heavy beams anywhere under cover. With other New Zealand conifers particularly eligible for forest valleys. A most suitable tree for cemeteries, on account of its pendulous branches.

Dacrydium Franklini, Hooker fil.

Huon Pine of Tasmania; only found in moist forest recesses, and might be planted in dense fern-tree gullies. Height of tree, 100 feet; stem circumference, 20 feet. The wood is highly esteemed for ship-building and various artisans' work.

Dacrydium Kirkii, F. v. Mueller.

New Zealand. The "Manoao." A pyramidal tree, attaining 80 feet in height; stem a diameter of 4 feet. Timber of a reddish colour and extreme durability (Professor Kirk). Bears seeds abundantly.

Dactylis cæspitosa, Forster. (*Poa Forsteri*, Steudel.)

Fuegia, Falkland's Island, South Patagonia. The Tussock Grass. Introduced by Sir Joseph Hooker into the Hebrides, and by Mr. Traill into the Orkney Islands. Delights, according to Mr. Ingram, in deep, boggy, and mossy land, even when exposed to sea-spray. Cultivated plants might be dressed with some salt. Thrives in cold countries near the sea in pure sand, at the edge of peat bogs. It would likely prosper in our Alpine moors. It is perennial, and reaches to a height of 9 feet. It is very nutritious, and much sought by herds. The base of stem is nutty and edible.

Dactylis glomerata, Linné.*

Europe, North Africa, North and Middle Asia. The Cock's-foot Grass. Perennial. One of the best of tall pasture grasses, adapted as well for dry as moist soil, thus even available for wet clays. It will live also under the shade of trees in forests. Its yield of fodder is rich and continuous, but its stems are hard. It is already largely cultivated, and has become naturalised. It is generally liked by cattle, unless when by understocking or neglect it has been allowed to become rank. Langethal observes: "What the Timothy Grass is for the more dry sandy soil, that is the Cock's-foot Grass for more binding soil, and no other (European) grass can be compared to it for copiousness of yield, particularly if the soil contains a fair quantity of lime. It grows quickly again after the first cutting and comes early on in the season. The nutritive power of this grass is of the first class."

Dactylis litoralis, Willdenow. (*Poa litoralis*, Gouan.)

From the Mediterranean countries to Siberia. This stoloniferous grass can be utilised for binding coast-sands; but it is of greater importance still in sustaining a Kermes insect (Porphyrophora Hamelii), which produces a beautiful purple dye (Simmonds).

Dalbergia miscolobium, Bentham.

Southern Brazil. This tree supplies a portion of the Jacaranda wood (Tschudi).

Dalbergia nigra, Allemao.

Brazil, down to the Southern Provinces. A tall tree, likely to prove hardy in our warmer and lower regions. It yields a portion of the Jacaranda or Palisander Wood, also Caviuna Wood, which, for rich furniture, have come into European use.

Several Brazilian species of Machærium afford, particularly M. incorruptibile (Allem), M. legale, and M. Allemani (Benth.), according to Saldanha da Gama, a similar precious wood; also timber for water-works and railway sleepers.

Dalbergia Sissoo, Roxburgh.

The Indian Sissoo Tree, ascending to elevations of 5,000 feet, attaining a height of 60 feet. It may be worthy of test whether in localities free of frost, particularly along sandy river banks, this important timber tree could be naturalised. Brandis found the transverse strength of the wood greater than that of teak and of sâl; it is very elastic, seasons well, does not warp or split, and takes a fine polish. It is also durable as a wood for boats. The tree is easily raised from seeds or cuttings, is of quick growth, and resists slight frosts. The supply of its wood has fallen short of the demand in India. Captain Campbell-Walker states that in the Panjáb artificial rearing of Sissoo is remunerative at only 15 inches annual rainfall, with great heat in summer and sharp frosts in winter; but irrigation is resorted to at an annual expense there of four shillings per acre. Sterile land is by the Sissoo-planting greatly ameliorated.

Dammara alba, Rumph. (*D. orientalis*, Lamb.)

Agath Dammar. Indian Archipelagos and mainland. A large tree up to 100 feet high, with a stem of up to 8 feet in diameter; straight and branchless for two-thirds its length. It is of great importance on account of its yield of the transparent Dammar resin, extensively used for varnish.

Dammara Australis, Lambert.*

Kauri Pine. North island of New Zealand. This magnificent tree measures, under favourable circumstances, 180 feet in height and 17 feet in diameter of stem; the estimated age of such a tree being 700 or 800 years. It furnishes an excellent, remarkably durable timber, straight-grained, and much in use for masts, boats, superior furniture, casks, rims of sieves, and particularly sought for decks of ships, lasting for the latter purpose twice as long as the deal of many other pines. It is also available for railway break-blocks and for carriages, and regarded as one of the most durable among timber of the Coniferæ. Braces, stringers, and tie-beams of wharves remained, according to Professor Kirk, for very many years in good order under much traffic. In bridge-building the Kauri timber gave also excellent results; it can likewise be used advantageously for railway sleepers. Kauri ought to be

extensively introduced into our denser forests. Auckland alone exports about £20,000 worth of Kauri timber annually. It is easily worked, and takes a high polish. It yields, besides, the Kauri resin of commerce, which is largely got from under the stem of the tree. The greatest part is gathered by the Maoris in localities formerly covered with Kauri forests; pieces weighing 100 lbs. have been found in such places.

Dammara macrophylla, Lindley.

Santa Cruz Archipelagos. A beautiful tree, 100 feet high, resembling D. alba.

Dammara Moorei, Lindley.

New Caledonia. Height of tree about 50 feet.

Dammara obtusa, Lindley.

New Hebrides. A fine tree, 200 feet high, with a long, clear trunk resembling D. Australis.

Dammara ovata, C. Moore.

New Caledonia. This tree is rich in Dammar resin.

Dammara robusta, C. Moore.

Queensland. Kauri. A tall tree, known from Rockingham's Bay and Wide Bay. It thrives well, even in open, exposed, dry localities at Melbourne. Height up to 130 feet; largest diameter of stem 6 feet; free of knots and easily worked. Market value £3-10 for 1,000 superficial feet of timber. The species is closely allied to the Indian D. alba.

Dammara Vitiensis, Seemann.

In Fiji. Tree 100 feet high; probably identical with Lindley's D. longifolia.

Danthonia bipartita, F. v. Mueller.

From the interior of New South Wales and Queensland to West Australia. Available as a tender-leaved and productive perennial grass for any desert regions.

Danthonia Cunninghami, J. Hooker.

New Zealand. A splendid Alpine fodder grass with large panicles.

Danthonia nervosa, J. Hooker.

Extra-tropical Australia. One of the best of nutritious swamp grasses.

Danthonia robusta, F. v. Mueller.

Australian Alps. Forms large patches of rich forage at the very edge of glaciers. The tall *D. rigida* (Raoul) of New Zealand is closely allied.

Daucus Carota, Linné.

Europe, North Africa, extra-tropical Asia east to Japan. The Carrot. Biennial. Admits of naturalisation along our shores. Beyond the ordinary culinary utilisation it serves for the distillation of a peculiar oil. Large-rooted varieties as well as the herb give a good admixture to stable fodder. Carrot treacle can also be prepared from the root. Requires lime in the soil for its prolific culture. The chemical substances carotin and hydrocarotin are derived from it.

Debregeasia edulis, Weddell.

The Janatsi-itsigo or Teon-itsigo of Japan. . Berries of this bush edible, fibre valuable for textile fabrics. A few Indian species, with fibre resembling that of Boehmeria, ascend to the Himalayas for several thousand feet, and may therefore be very hardy,—namely, D. velutina, D. Wallichiana, D. hypoleuca; the latter extends to Abyssinia, where it has been noticed at elevations of 8,000 feet. On mountains in Java occurs D. dichotoma.

Dendrocalamus giganteus, Munro.

Malacca and the adjacent islands. Habit of Gigantochloa maxima; therefore one of the mightiest of all Bamboos.

Dendrocalamus Hamiltoni, Nees.

Himalayas, between 2,000 and 6,000 feet. Height up to 60 feet. The young shoots of this stately Bamboo are edible in a boiled state (Brandis). It eudures great cold as well as dry heat (Kurz).

Dendrocalamus strictus, Nees.

India, particularly Bengal. Grows on drier ground than Bamboos generally. Its strength and solidity render it fit for many select technic purposes. It attains a height of 100 feet and forms occasionally forests of its own. It endures great cold as well as dry heat (Kurz).

Desmodium triflorum, Candolle.

In tropical regions of Asia, Africa, and America. A densely matted perennial herb, alluded to on this occasion as recom-

mendable for places too hot for ordinary clover, and as representing a large genus of plants, many of which may prove of value for pasture. Dr. Roxburgh already stated that it helps to form the most beautiful turf in India, and that cattle are very fond of this herb. Colonel Drury informs us that it is springing up on all soils and situations, supplying there the place of Trifolium and Medicago.

Dicksonia Billardierii, F. v. Mueller. (*D. antartica*, Labillardière, *Cibotium Billardièrii*, Kaulfuss).

South-East Australia, New Zealand. This tree-fern is mentioned here, as it is the very best for distant transmission and endures some frost. It attains a height of 40 feet. Important also as commercial plants among fern-trees are *Cyathea medullaris*, of South-East Australia and New Zealand; *Cyathea dealbata*, the Silvery Tree-Fern; and *C. Smithii*, also of New Zealand; because their transit in an up-grown state is not attended with the same difficulty as that of the tall *Alsophila Australis* (which attains 60 feet), and numerous other tree-ferns, about 200 species now being known; they are also among the hardiest of this noble kind of plants. Anthelminthic properties, which may exist in these and many other ferns, have not yet been searched for. The dust-like spores should be scattered through moist forest-valleys to ensure new supplies of these superb forms of vegetation for the next century. *D. Billardièrii* is nowhere Antarctic.

Digitalis purpurea, Linné.

Greater part of Europe. The Foxglove. A biennial and exceedingly beautiful herb of great medicinal value, easily raised. Chemical principles: digitalin, digitaletin, and three peculiar acids.

Dioscorea aculeata, Linné.

The Kaawi Yam. India, Cochin-China, South Sea Islands. Stem prickly, as the name implies, not angular. Leaves alternate, undivided. It ripens later than the following species, and requires no reeds for staking. It is propagated from small tubers. This yam is of a sweetish taste, and the late Dr. Seemann regarded it as one of the finest esculent roots of the globe. A variety of a bluish hue, cultivated in Central America (for instance at Caracas), is of very delicious taste.

Dioscorea alata, Linné.

The Uvi Yam. India and South Sea Islands. The stems are four-angled and not prickly. The tubers, of which there

are many varieties, will attain, under favourable circumstances, a length of 8 feet, and the prodigious weight of one hundred pounds! This species and the preceding one are the two principal kinds cultivated in tropical countries. D. alata is in culture supported by reeds. It is propagated from pieces of the old root, and comes in warm climes to perfection in about seven months. The tubers may be baked or boiled. It is this species which has been successfully cultivated in New Zealand and also in the Southern States of North America.

Dioscorea glabra, Roxburgh.* (*D. Batatas,* Decaisne.)

The Chinese Yam. From India to China. Not prickly. The root is known to attain a length of 4 feet, with a circumference of 14 inches and a weight of about 14 lbs. The inner portion of the tuber is of snowy whiteness, of a flaky consistence, and of a delicious flavour; preferred by many to potatoes, and obtained in climes too hot for potato crops. The bulbilles from the axils of the leaf-stalks, as in other Dioscoreas, serve as sets for planting, but the tubers from them attain to full size only in the second year, the produce being in proportion to the set planted. The upper end of the tubers offers ready sets, but there are dormant eyes on any portion of the surface of the tubers (Sir Samuel Wilson; General Noble). First grown here by the author in 1858.

Dioscorea globosa, Roxburgh.

India. Roxburgh states this to be the most esteemed Yam in Bengal.

Dioscorea hastifolia, Nees.

Extra-tropical Western Australia, at least as far south as 32°. It is evidently one of the hardiest of the Yams, and on that account deserves particularly to be drawn into culture. The tubers are largely consumed by the local aborigines for food; it is the only plant on which they bestow any kind of cultivation, crude as it is; fit for arid situations, but seemingly fond of lime.

Dioscorea Japonica, Thunberg.

The hardy Japan Yam. Not prickly. The material here for comparison is not complete, but seems to indicate that D. transversa, R. Br., and D. punctata, R. Br., are both referable to D. Japonica. If this assumption should prove correct, then we have this Yam along the coast tracts of North and East

Australia as far south as latitude 33°. In Australia we find the wild root of good taste.

Dioscorea nummularia, Lamarck.

The Tivoli Yam. Continental and insular India, also South Sea Islands. A high, climbing, prickly species, with opposite leaves. Roots cylindrical, as thick as an arm; their taste exceedingly good.

Dioscorea oppositifolia, Linné.

India and China. Not prickly. One of the edible Yams.

Dioscorea pentaphylla, Linné.

Continental and insular India, also South Sea Islands. Likewise a good Yam. A prickly species, with alternate divided leaves.

Dioscorea purpurea, Roxburgh.

India. In Bengal considered next best to D. alata.

Dioscorea quinqueloba, Thunberg.

Japan, and there one of several Yam plants with edible tubers. Among numerous congeners are mentioned as providing likewise root vegetables: D. piperifolia (Humboldt) from Quito, D. esurientum (Fenzl) from Guatemala, D. tuberosa and D. conferta (Vellozo) from South Brazil, D. Cayennnensis (Lamarck) from tropical South America, D. triphylla (Linné) from tropical Asia, D. deltoidea (Wallich) from Nepal. Of these and many other species the relative quality of the roots, and the degree of facility of their field cultivation, require to be more ascertained.

Dioscorea sativa, Linné.

South Asia, east as far as Japan, also in the South Sea Islands, and North and tropical East Australia, likewise recorded from tropical Africa. Stem cylindrical, not prickly. The acrid root requires soaking before boiling. It has proved hardy in the Southern States of North America.

Dioscorea spicata, Roth.

India. Root used like those of other species.

Dioscorea tomentosa, Koenig.

Ooyala Yam. India. The nomenclature of some of the Asiatic species requires further revision.

Dioscorea trifida, Linné fil.

Central America. One of the Yams there cultivated. Various other tuberous Dioscoreæ occur in tropical countries, but their respective degrees of hardiness, taste, and yield are not recorded or ascertained. The length of the warm season in many extra-tropical countries is probably sufficient for ripening all these Yams.

Diospyros Ebenum, Koenig.*

Ceylon, where it furnishes the best kind of Ebony wood. It is not uncommon up to 5,000 feet in that island, according to Dr. Thwaites; hence I would recommend this large and valuable tree for test plantations in warm extra-tropical lowland forest regions, where also D. quæsita and D. oppositifolia (Thwaites), the best Calamander Trees and D. melanoxylon, should be tried. Many other species of Diospyros could probably be introduced from the mountains of various tropical regions, either for the sake of their ebony-like wood or their fruit. Black Ebony wood sinks in water. The price in England ranges from £8 to £10 per ton, from 700 to 1,000 tons being imported into Britain annually for pianoforte keys, the string-holders of musical instruments, and other select purposes. The following species yield Ebony wood, according to Hiern, some of which may prove hardy: *Indian*—D. Ebenum, Koen.; D. melanoxylon, Roxb.; D. silvatica, Roxb.; D. Gardneri, Thw.; D. hirsuta, L. fil.; D. discolor, Willd.; D. Embryopteris, Thw.; D. Ebenaster, Retz.; D. montana, Roxb.; D. insignis, Pers.; D. Tupru, Hamilt.; D. truncata, Zoll.; D. ramiflora, Wall. *African*—D. Dendo, Welw.; D. mespiliformis, Hochst. *Mauritius*—D. tesselaria, Poiret. *Madagascar*—D. haplostylis, Boivin; D. microrhombus, Hiern.

Diospyros Kaki, Linné fil.

The Date Plum of China and Japan. A slow-growing not very productive tree, here recorded for completeness. The fruit is yellow or pink, or dark purple, variable in size, but seldom larger than an ordinary apple; it can readily be dried on strings. A hard and soft variety occur. It has ripened at Sydney and as far north as Philadelphia (Saunders). The most famed varieties are, according to the Rev. Mr. Loorins, Ronosan, Nihon, Micado, Daimio, Taikoon, Yamato, the latter particularly large and saccharine, and, with the Jogen variety, particularly used for drying. In Japan thought to be the best of its native fruits (Christie); attains one pound in weight. There is also a small seedless variety. Dried Kaki fruit is considered superior to figs.

Diospyros Lotus, Linné.

From Northern China to the Caucasus. The ordinary Date Plum. The sweet fruits of this tree, resembling black cherries, are edible, and also used for the preparation of syrup. The wood, like that of D. chloroxylon, is known in some places as Green Ebony. It resembles Mottled Ebony; it must not, however, be confounded with other kinds, such as are furnished by some species of Excœcaria, Nectandra, and Jacaranda.

Diospyros Virginiana, Linné.

The North American Ebony or Parsimon or Persimmon. A tree 60 feet high. Wood very hard and blackish. The sweet variety yields a good table fruit. Hot summers promote the early ripening and sweetness of the fruit, the delicious taste not depending on early frost. Ripens fruit to 41° north in Illinois (Bryant). The final sweetness depends upon chemical decomposition.

Diposis Bulbocastanum, Candolle.

Chili. The tubers of this perennial herb are edible (Philippi).

Dipsacus fullonum, Linné.

Fuller's Teazel. Middle and South Europe and Middle Asia. A tall biennial herb. The thorny fruit-heads are used for fulling in cloth factories. The import during one of the last years into England was valued at £5,000. The plant is most easily raised. The use of these Teazels has not yet been superseded by any adequate machinery.

Dirca palustris, Linné.

North America. An ornamental forest shrub, the tough bark of which is serviceable for straps and whipcords.

Distichlis maritima, Rafinesque. (*Festuca distichophylla*, J. Hooker.)

North and South America, extra-tropical Australia. This dwarf Creeping Grass is of great value for binding soil, forming rough lawns, edging garden plots in arid places, and covering coast sand.

Dolichos Lablab, Linné.

Warmer parts of Africa; probably thence spread widely through the tropics. An annual herb, sometimes lasting through several years. The young pods, as well as the ripe seeds, available for culinary use, but not of all varieties. It delights in rice soil, and ripens in hot countries within three months; its yield

is about forty-fold according to Roxburgh. The whole plant forms excellent stable feed for cattle.

Dolichos uniflorus, Lamarck.

Tropical and sub-tropical Africa and Asia. An annual herb, the Horse Gram of South India, where it is extensively grown. Colonel Sykes got over 300 seeds from a moderate-sized plant. Dr. Stewart saw it cultivated up to 8,000 feet. Content with poor soils; well adapted for stable pulse.

Dorema Ammoniacum, Don.

Persia, on mountains up to 4,000 feet. A tall perennial herb, yielding the gum-resin Ammoniacum, which might be obtained from plants to be introduced into our snowy mountains.

Dracocephalum Moldavica, Linné.

North and Middle Asia. An annual showy scent-herb.

Drimys Winteri, R. and G. Forster.

Extra-tropical South America. The Canelo of Chili, sacred nnder the name of Boighe to the original inhabitants. Attains in river-valleys a height of 60 feet. The wood never attacked by insects (Dr. Philippi); thus the Australian species may be equally valuable.

Duboisia Hopwoodii, F. v. Mueller.

The Pitury. Inland desert regions from New South Wales and Queensland to near the west coast of Australia. This shrub deserves cultivation on account of its highly stimulating properties (Bancroft, Rudall) *D. myoporoides* of East Australia and New Caledonia, has come into use for ophthalmic surgery. The alkaloid of the latter, *duboisin,* is allied to piturin.

Ecballion Elaterium, Richard.

Mediterranean regions and Orient. The Squirting Cucumber. An annual. The powerful purgative Elaterium is prepared from the pulp of the fruit. Chemical principles: elaterid, elaterin, hydroelaterin.

Ehrharta diplax, F. v. Mueller. (*Microlæna avenacea,* J. Hooker.)

New Zealand. This tall perennial grass is fond of woodlands, and deserves introduction. It is likely to prove a rich pasture grass. A few Australian species, particularly of the section Tetrarrhena, are readily accessible to us, and so indeed also

the South African Ehrhartas, all adapted for a warm temperate clime, the majority perennial, and several of superior value. Ehrharta caudata, Munro, is indigenous in Japan.

Ehrharta stipoides, Labillardière.

Extra-tropical Australia, also New Zealand. A perennial grass, which keeps beautifully green all through the year. For this reason its growth for pasturage should be encouraged, particularly as it will live on poor soil. Mr. W. H. Bacchus, of Ballarat, considers it nearly as valuable as Kangaroo-Grass, and in the cool season more so. He finds it to bear over-stocking better than any other native grass, and to maintain a close turf. It is, however, not always copiously seeding.

Elæagnus parvifolius, Royle.

From China to the Himalayas. This bush has been introduced as a hedge plan into North America, and, according to Professor Meehan, promises great permanent success, as it has already achieved a high popularity in this respect. Several other species might well be experimented on in the same manner.

Elegia nuda, Kunth.

South Africa. A rush, able with its long root to bind moving sand; it also affords good material for thatching (Dr. Pappe). Many of the tall Restiaceæ of South Africa would prove valuable for scenic effect in gardens and conservatories, and among these may specially be mentioned Cannamois cephalotes (Beauv.).

Eleusine Coracana, Gaertner.

Southern Asia, east to Japan, ascending the Himalayas to 7,000 feet. Though annual, this grass is worthy of cultivation on account of its height and nutritiveness. Horses prefer the hay to any other dry fodder in India, according to Dr. Forbes Watson. The large grains can be used like millet. E. Indica (Gaertner) only differs as a variety. It extends to tropical Australia and is recorded also from many other tropical countries.

Eleusine stricta, Roxburgh.

India. The increase of grain of this annual grass in rich soil is at times five-hundredfold. E. Tocusso, Fresenius, is a valuable kind from Abyssinia, seemingly allied to E. stricta. The Arabian and Himalayan E. flagellifera, Nees, is perennial. Other species of Eleusine are deserving of trial.

Elymus arenarius, Linné.*

The Sea Lyme-Grass. Europe and North Asia, on sand coasts. One of the most important and vigorous of grasses for binding drift sand on the sea-shores. The North American E. mollis, Trinius, is allied to this species.

Elymus condensatus, Presl.

The Bunch-Grass of British Columbia and California. This is favourably known as adapted for sand land.

Embothrium coccineum, R. and G. Forster.

From Chili to Magellan's Straits. The Notra or Ciruelillo of Chili. A tree of exquisite beauty, but seldom extending to beyond 30 feet in height. The wood is utilised for furniture. E. lanceolatum is merely a variety (Dr. Philippi). The equally gorgeous E. emarginatum of the Peruvian Andes and E. Wickhami from Mount Bellenden-Ker of North Queensland deserve, with the East Australian allied Stenocarpus sinuatus, a place in any sheltered gardens or parks of the warm temperate zone.

Encephalartos Denisonii, F. v. Mueller.

New South Wales and Queensland. This noble Pine-Palm is hardy in Melbourne and to be regarded as a most desirable acquisition to our garden scenery, along with E. spiralis, E. Preissii, and the South African species. All admit of translocation even when of large size and when many years old. The stems, with an unusual tenacity of life, remain sometimes dormant after removal for several years.

Engelhardtia spicata, Blume.

The spurious Walnut Tree of the mountains of Java and the Himalayas. It reaches a height of 200 feet.

Erianthus fulvus, Kunth.

Interior of Australia. A sweet perennial grass, of which cattle are so fond as to eat it closely down, and thus cause it to die out (Bailey). Readily raised by re-dissemination.

Eriochloa annulata, Kunth.

In tropical regions around the globe. Endures moderate cold in South Queensland, and affords fodder all the year round (Bailey).

Ervum Lens, Linné. (*Lens esculenta*, Moench.)

Mediterranean regions, Orient. Cultivated up to an elevation of 11,500 feet in India. The Lentil. Annual, affording in its seeds a palatable and nutritious food. A calcareous soil is essential for the prolific growth of this plant. The leafy stalks, after the removal of the seeds, remain a good stable-fodder. The variety called the Winter Lentil is more prolific than the Summer Lentil.

Erythroxylon Coca, Lamarck.*

Peru. This shrub is famed for the extraordinary stimulating property of its leaves, which pass under the names of Spadic and Coca. They contain two alkaloids, cocain and hygrin; also a peculiar tannic acid. More than £600,000 worth is annually collected. The Peruvians mix the leaves with the forage of mules, to increase their power of enduring fatigue. Whether any of the many other species of Erythroxylon possess similar properties seems never yet to have been ascertained.

Eucalyptus acmenoides, Schauer.

New South Wales and East Queensland. The wood used in the same way as that of E. obliqua (the Stringy Bark Tree), but superior to it. It is heavy, strong, durable, of a light colour, and has been found good for palings, flooring boards, battens, rails, and many other purposes of house carpentry (Rev. Dr. Woolls).

Eucalyptus amygdalina, Labillardière.

South-East Australia. Vernacularly known as Brown and White Peppermint Tree or Mountain Ash. In sheltered springy forest glens attaining exceptionally a height of over 400 feet, there forming a smooth stem and broad leaves, producing also seedlings of a foliage different to the ordinary state of E. amygdalina, as occurs in more open country, which has small narrow leaves and a rough brownish bark. The former species or variety, which might be called Eucalyptus regnans, represents probably the loftiest tree on the globe. Mr. W. Robinson, Surveyor, measured a tree at the foot of Mount Baw-Baw, which was 471 feet long. Another tree in the Cape Otway ranges was found to be 415 feet long and 15 feet in diameter, where cut for felling, at a considerable height above the ground. The wood is fissile, well adapted for shingles, rails, for house-building, for the keelson and planking of ships, and other purposes; the wood of the smaller rough-barked variety has proved very lasting for fence posts. Labillardière's name applies ill to any of the

forms of this species. Seedlings raised on rather barren ground near Melbourne have shown the same amazing rapidity of growth as those of E. globulus; yet, like those of E. obliqua, they are not so easily satisfied with any soil. In the south of France this tree grew to a height of 50 feet in 8 years. It has endured the frosts of the milder parts of England, with E. polyanthemos and E. viminalis. In New Zealand it has survived the cold, where E. globulus succumbed. E. amygdalina, E. urnigera, E. coccifera, E. rostrata, and E. corymbosa have proved at Rome, according to the Rev. M. Gildas, more hardy than E. globulus, E. diversicolor, E. resinifera, E. longifolia, and E. melliodora. Professor Balfour observed that E. viminalis has stood since thirty years in the open air at Haddington (South Scotland), attaining a height of 50 feet and a base of 8 feet in circumference; shelter against hard winds in these cases is imperative. The now well-known medicinal Eucalyptus oil, the distillation of which was initiated by the writer, is furnished in greater or smaller proportion by all the different species. It was first brought extensively into commerce by Mr. Bosisto, who has the credit of having ascertained many of the properties of this oil for technic application.

It is this species which yields more volatile oil than any other hitherto tested, and which therefore is largely chosen for distillation; thus it is also one of the best for subduing malarian effluvia in fever regions, although it does not grow with quite the same ease and celerity as E. globulus. The respective hygienic value of various Eucalypts may to some extent be judged from the percentage of oil in their foliage, as stated below, and as ascertained by Mr. Bosisto, at the author's instance, for the Exhibition of 1862:—

E. amygdalina	3·313	per cent.	volatile oil.
E. oleosa	1·250	,,	,,
E. leucoxylon	1·060	,,	,,
E. goniocalyx	0·914	,,	,,
E. globulus	0·719	,,	,,
E. obliqua	0·500	,,	,,

The lesser quantity of oil of E. globulus is, however, compensated for by the vigour of its growth and the early copiousness of its foliage. The proportion of oil varies also somewhat according to locality and season. E. rostrata, though one of the poorest in oil, is nevertheless important for malaria regions, as it will grow well on periodically inundated places, and even in stagnant water not saline. E. oleosa (F. v. M.), from the desert regions of extra-tropical Australia, might be reared on barren sands of other countries for the sake of its oil. According to

Mr. Osborne's experiment, initiated by myself, Eucalyptus oils dissolve the following among other substances for select varnishes and other preparations: camphor, pine resins, mastic, elemi, sandarac, kauri, dammar, asphalt, xanthorrhœa resin, dragon's-blood, benzoe, copal, amber, anime, shellac, caoutchouc, also wax, but not gutta-percha. These substances are arranged here in the order of their greatest solubility. The potash obtainable from the ashes of various Eucalypts varies from five to twenty-seven per cent. One ton of the fresh foliage of E. globulus yields about 8½ lbs. of pearl ash, a ton of the green wood about 2¼ lbs., of dry wood about 4½ lbs. For resins, tar, acetic acid, tannin, and other products of many Eucalypts, see various documents and reports of the writer, issued from the Melbourne Botanic Garden.

Eucalyptus botryoides, Smith.

From East Gippsland to South Queensland. One of the most stately among an extensive number of species, remarkable for its dark-green shady foliage. It delights on river banks. Stems attain a length of 80 feet without a branch, and a diameter of 8 feet. The timber usually sound to the centre, adapted for water-works, wagons, knees of boats, &c. Posts of it very lasting, as no decay was observed in fourteen years.

Eucalyptus calophylla, R. Brown.

South-West Australia, where it is vernacularly known as Red Gum Tree. More umbrageous than most Eucalypts and of comparatively rapid growth. In its native forests it has quite the aspect of the eastern Iron Bark Trees. The wood is free of resin when grown on alluvial land, but not so when produced on stony ranges. It is preferred to that of E. marginata and E. cornuta for rafters, spokes, and fence rails, also used for handles and agricultural implements; it is strong and light, but not long-lasting underground. The bark is valuable for tanning, as an admixture to Acacia bark; the seed vessels of this and perhaps all other Eucalypts can be used for the same purpose. The stem of this tree may occasionally be observed 10 feet in diameter; it is the only tree in West Australia which yields copiously the fluid and indurating kino.

Eucalyptus citriodora, Hooker.

Queensland. A handsome slender tree with a smooth white bark, supplying a useful timber. According to notes of the late Mr. Thozet, a trunk 40 feet long and 20 inches in diameter

broke after a flection of 17 inches under a pressure of 49 tons. It combines with the ordinary qualities of many Eucalypts the advantage of yielding from its leaves a rather large supply of volatile oil of excellent lemon-like fragrance, in which respect it has, among about 150 species of Eucalypts, only one rival.

Eucalyptus coriacea, A. Cunningham. (*E. panoiflora,* Sieber).

New South Wales, Victoria, Tasmania. A tree of handsome appearance, with a smooth, white bark, and generally drooping foliage, attaining considerable dimensions; vernacularly known as a White Gum or Drooping Gum or Swamp Gum-Tree. It grows best in moist gound, ascends to an elevation of 5,000 feet, and is one of the hardiest of all its congeners. Its timber is used for ordinary building and fencing purposes.

Eucalyptus cornuta, Labillardière.

The Yate Tree of South-West Australia. A large tree of rapid growth, preferring a somewhat humid soil. The wood is used for various artizans' work, and there preferred for the strongest shafts and frames of carts and other work requiring hardness, toughness, and elasticity, and is considered equal to the best Ash Wood. The tree appears to be well adapted for tropical countries, for Dr. Bonavia reports that it attained a height of 8 to 10 feet in the first year of its growth at Lucknow, and that the plants did not suffer in the rainy season like many other Eucalypts. The dry wood sinks in water.

Eucalyptus corymbosa, Smith.

The Bloodwood Tree of New South Wales and Queensland. A tree attaining large dimensions; it has a rough furrowed bark and a dark-red wood, soft when green, but very hard when dry, very durable under ground, and therefore extensively used for fence-posts, rails, railway sleepers, etc. (Hartmann). The bark is rich in kino.

Eucalyptus crebra, F. v. Mueller.

The Narrow-leaved Iron-Bark Tree of New South Wales and Queensland. Wood reddish, hard, heavy, elastic, and durable; much used in the construction of bridges and for railway sleepers, also for wagons, piles, fencing, etc. E. melanophloia, F. v. M., the Silver-leaved Iron-Bark Tree, and E. leptophleba and E. drepanophylla, are closely allied species of similar value. They all exude astringent gum resin in considerable quantity, resembling kino in appearance and property.

Eucalyptus diversicolor, F. v. Mueller. (*E. colossea,* F. v. M.)

The Karri of South-West Australia. A colossal tree, excep-

tionally reaching the height of 400 feet, with a proportionate girth of the stem. Mr. Muir measured stems about 300 feet long without a branch; widths of timber of as much as 12 feet can be obtained. Furnishes good timber for ship and boat plank, particularly for masts, likewise for wheels; also valuable for shafts, spokes, felloes, fence-rails; it is elastic and durable, but not so easily wrought as that of E. marginata. Fair progress of growth is shown by the young trees, planted even in dry exposed localities in Melbourne. The shady foliage and quick growth of the tree promise to render it one of our best for avenues. In its native localities it occupies fertile, rather humid valleys, and represents there the E. amygdalina *var.* regnans of South-East Australia in habit.

Eucalyptus Doratoxylon, F. v. Mueller.

The Spear-Wood of South-West Australia, where it occurs in sterile districts. The stem is slender and remarkably straight, and the wood of such firmness and elasticity that the nomadic natives wander long distances to obtain it as material for their spears.

Eucalyptus eugenioides, Sieber.

New South Wales. Regarded by the Rev. Dr. Woolls as a fully distinct species. Its splendid wood, there often called Blue Gum-Tree wood, is available for many purposes, and largely utilised for ship-building.

Eucalyptus ficifolia, F. v. Mueller.

South-West Australia. Although not a tree of large dimensions, this splendid species should be mentioned for the sake of its magnificent trusses of crimson flowers, irrespective of its claims as a shady, heat-resisting avenue tree. It bears a close resemblance to E. calophylla.

Eucalyptus globulus, Labillardière.

Blue Gum-Tree of Victoria and Tasmania. This tree is of extremely rapid growth, and attains a height of 350 feet, furnishing a first-class wood; ship-builders get keels of this timber 120 feet long; besides this, they use it extensively for planking and many other parts of the ship, and it is considered to be in some respects superior to American White Oak. A test of strength has been made between some Blue Gum, English Oak, and India Teak. The Blue Gum carried 14 lbs. weight more than the Oak, and 17 lbs. 4 ozs. more than Teak, upon the square inch. Blue Gum wood, besides for ship-building, is very extensively

used by carpenters for all kinds of out-door work, also for fence-rails, telegraph poles, railway sleepers—lasting nine years or more—for shafts and spokes of drays, and a variety of other purposes. E. globulus is hardier than Orange and Lemon plants. In South Europe it has withstood a temperature of 7° Celsius, but succumbed at 9°; it perished from frost at the Black Sea and in Turkestan, according to Dr. Regel. The sirocco, however, does not destroy it. Regarding the celerity of its growth, Mr. Thomson mentions that it attains 60 feet in 7 years in Jamaica on the hills; in California it grew 60 feet in 11 years, in Florida 40 feet in 4 years, attaining a stem of 1 foot in diameter. In some parts of India its growth has even been more rapid; at the Nilgiri hills it has been reared advantageously, where E. marginata, E. obliqua, E. robusta and E. calophylla had failed. The price of the timber in Melbourne is about 1*s*. 7*d*. per cubic foot.

Eucalyptus gomphocephala, Candolle.

The Tooart of South-West Australia; attains a height of 120 feet, the clear trunk up to 50 feet long. The wood is close-grained, hard, and not rending. It is used for ship-building, wheelwrights' work, and other purposes of artizans. This species, as well as E. odorata, E. fœcunda, and E. decipiens, thrives best in limestone soil.

Eucalyptus goniocalyx, F. v. Mueller.

From Cape Otway to the southern parts of New South Wales, generally known as Bastard Box, mostly found on clayey ridges. A large tree which should be included among those for new plantations. Its wood resembles in many respects that of E. globulus and is comparatively easily worked. For house-building, fence-rails, and similar purposes it is extensively employed in those forest districts where it is abundant, and has proved a valuable timber. It is especially esteemed for wheelwrights' work (Falck)..

Eucalyptus Gunnii, J. Hooker.

Victoria, Tasmania, and New South Wales, at Alpine and Sub-Alpine elevations. The other more hardy Eucalypts comprise E. coriacea, E. alpina, E. urnigera, E. coccifera, and E. vernicosa, which all reach heights covered with snow for several months in the year.

Eucalyptus hemiphloia, F. v. Mueller.

New South Wales and South Queensland; local vernacular

name also Box Tree. To be regarded as a timber tree of great excellence, on the authority of the Rev. Dr. Wools. It is famous for the hardness and toughness of its timber, which is used for railway sleepers, telegraph posts, shafts, spokes, plough-beams, and similar utensils.

Eucalyptus leucoxylon, F. v. Mueller.

The ordinary Iron-Bark Tree of Victoria and some parts of South Australia and New South Wales. It attains a height of 100 feet, and supplies a valuable timber, possessing great strength and hardness; it is much prized for its durability by carpenters, ship-builders, etc. It is largely employed by wagon-builders for wheels, poles, etc.; by ship-builders for top-sides, treenails, the rudder (stock), belaying-pins, and other purposes; it is also used by turners for rough work. This is considered the strongest wood in Victoria. It is much recommended for railway sleepers, and extensively used in underground mining work. It is very extensively employed for the handles of axes and other implements by Victorian manufacturers. The price of the timber in the log is about *2s. 5d. per cubic foot in Melbourne. As it is for some purposes* superior to that of almost any other Eucalyptus, the regular culture of this tree over wide areas should be fostered, especially as it can be raised on stony ridges not readily available for ordinary husbandry. The wood is sometimes pale, or in other localities rather dark. The tree is generally restricted to the lower Silurian sandstone and slate formation with ironstone and quartz. The bark is remarkably rich in kino tannin, yielding up to 22 per cent. in the fresh state, but much less after drying. The kino tanning is not equal in value to the mimosa tannic acid from Acacia bark, but it is useful as a subsidiary admixture when light-coloured leather is not aimed at. As an astringent drug this kino is not without importance. E. leucoxylon has, next to E. rostrata, thriven best about Lucknow (in India) among the species tried there for forest culture. E. sideroxylon is a synonym.

Eucalyptus loxophleba, Bentham.

The York Gum-Tree of extra-tropic West Australia. Attains a height of about 100 feet and a stem 4 feet in diameter. The wood is very tough and preferably sought in West Australia for naves and felloes of wheels, but is not suited for fence-rails. Even when dry, it is heavier than water.

Eucalyptus macrorrhyncha, F. v. Mueller.

The common Stringy Bark Tree of Victoria, extending also to

New South Wales. This tree attains a height of about 120 feet, and is generally found growing on sterile ridges, not extending to the higher mountains. The wood, which contains a good deal of kino, is used for fence-rails and rough building purposes, also extensively for fuel; the fibrous dark-brown bark serves for roofs of huts and also for tyeing.

Eucalyptus maculata, Hooker.

The Spotted Gum-Tree of New South Wales and South Queensland. A lofty tree, the wood of which is employed in ship-building, wheelwrights' and coopers' work. The heart-wood is as strong as that of British oak (Dr. Woolls).

Eucalyptus marginata, Smith.*

The Jarrah or Mahogany Tree of South-West Australia, famed for its indestructible wood, which is attacked neither by chelura, nor teredo, nor termites, and therefore so much sought for jetties and other structures exposed to sea-water; also for any underground work, telegraph poles, and largely exported for railway sleepers. Vessels built of this timber have been enabled to do away with all copper-plating. It is very strong, of a close grain and a slightly oily and resinous nature; it works well, makes a fine finish, and is by ship-builders here considered superior to either sál, teak, or any other wood except perhaps English or Live oak. In West Australia it is much used for flooring, rafters, shingles, also for furniture, as it takes a good polish and then looks very beautiful. It is not too hard, and is thus more easily worked than E. redunca and E. loxophleba. The wood from the hills is darker, tougher, and heavier than that from the plains. Well-seasoned timber weighs about 64 lbs. per cubic foot; freshly cut, from 71 to 76 lbs. It is one of the least inflammable woods according to Captain Fawcett. In West Australia it is regarded as one of the best woods for charcoal. The trees should be felled in autumn or towards the end of summer, in which case the timber will not warp. The tree grows chiefly on ironstone ranges. At Melbourne it is not quick of growth, if compared to E. globulus, Lab., or to E. obliqua, l'Her., but it is likely to grow with celerity in mountainous country. In its native country it presents the features of the East Australian stringy bark forests. Stems of this tree have been measured 80 feet to the first branch, and 32 feet in circumference at 5 feet from the ground. Instances are on record of the stem having attained a girth of 60 feet at 6 feet from the ground through the formation of buttresses.

Eucalyptus melanophloia, F. v. Mueller.

One of the Iron-Bark Trees of New South Wales and Queensland. A middle-sized tree with a deeply furrowed bark and mealy white foliage. The timber is strong and durable, and used for telegraph poles and railway sleepers; it is, however, very apt to split, unless well seasoned, when exposed to the sun.

Eucalyptus melliodora, A. Cunningham.

The Yellow Box Tree of Victoria and some parts of New South Wales; of a spreading habit of growth, attaining a height of about 120 feet with a comparatively stout stem. The wood is strong and durable, resembling that of E. rostrata in texture, but is of a paler colour and not quite so durable. It is esteemed for wheelwrights' and other artizans' work, and supplies excellent fuel; the young trees are used for telegraph poles.

Eucalyptus microcorys, F. v. Mueller.

One of the Stringy Bark Trees of New South Wales and Queensland. The wood is hard and durable, also underground; used for wheelwrights' work, railway sleepers, the young trees for telegraph poles; the foliage is very rich in volatile oil. Altogether a gigantic species.

Eucalyptus microtheca, F. v. Mueller.

Widely dispersed over the most arid extra-tropical, as well as tropical, inland regions of Australia. One of the best trees for desert tracts; in favourable places 150 feet high. Wood brown, sometimes very dark, hard, heavy, and elastic; prettily marked; thus used for cabinet-work, but more particularly for piles, bridges, and railway sleepers (Rev. Dr. Woolls).

Eucalyptus obliqua, L'Heritier.*

The ordinary Stringy Bark Tree of Tasmania, generally designated Messmate Tree in Victoria, attaining a height of 300 feet, with a stem more than 10 feet in diameter, growing mostly in mountainous country, attaining gigantic dimensions. The most extensively distributed and most gregarious of all Eucalypts, from Spencer's Gulf to the southern parts of New South Wales, and in several varieties designated by splitters and other wood-workers by different names; most extensively used for cheap fencing rails, palings, shingles, and any other rough wood-work not to be sunk underground nor requiring great strength or elasticity. The bulk of wood

obtained from this tree in very poor soil is perhaps larger than that of any other kind, and thus this species can be included even in its native country, where it is naturally common and easily re-disseminated, among the trees for new forest plantations in barren woodless tracts, to yield readily and early a supply of cheap and easily fissile wood. The young trees are sometimes used for telegraph poles. The fresh bark contains from 11 to 13½ per cent. kino tannic acid.

Eucalyptus oleosa, F. v. Mueller.

One of the smaller Eucalypts known as Mallee, extending from East to West Australia through the desert regions. The essential oil, in which the foliage of this species is very rich, dissolves, according to Mr. Bosisto, India-rubber without heat. It is also one of the best to dissolve amber and other fossil resins. The variety *longirostris* attains a height of 120 feet, with stems of 70 feet without a branch, in West Australia, where it is vernacularly known as Morrell. The wood is remarkably hard, splits freely, and is used for spears, rafters, fence-rails, wheelwrights' work, agricultural implements, etc. It is of a red tinge and sinks in water, also when dry.

Eucalyptus paniculata, Smith.

The White Iron-Bark Tree of New South Wales. This species furnishes a hard, durable wood, excellent for railway sleepers, according to the Rev. Dr. Woolls. It is also much used for building and fencing, as it splits well and is lasting underground. All the trees of this series are deserving of cultivation, as their wood, though always excellent, is far from alike, and that of each species preferred for special purposes of the artizan.

Eucalyptus phœnicea, F. v. Mueller.

Carpentaria and Arnhem's Land. Of the quality of the timber hardly anything is known, but the brilliancy of its scarlet flowers recommends this species to a place in any forest or garden plantation. For the same reason also E. miniata from North Australia, and E. ficifolia from South-West Australia, should be brought extensively under cultivation.

Eucalyptus pilularis, Smith.

The Black Butt Tree of South Queensland, New South Wales, and Gippsland. One of the best timber-yielding trees about

Sydney; of rather rapid growth (Rev. Dr. Woolls). It is much used for flooring-boards, also for railway sleepers and telegraph poles.

Eucalyptus platyphylla, F. v. Mueller.

Queensland. Regarded by the Rev. Julian Tenison Woods as one of the best of shade-trees, and seen to produce leaves sometimes 1½ feet long and 1 foot wide. This tree is available for open exposed localities, where trees from deep forest valleys would not thrive.

Eucalyptus polyanthemos, Schauer.

East Australia, generally known as Red Box. A tree up to 150 feet high, which furnishes an extremely hard and lasting timber; in great demand for mining purposes and railway sleepers, also for wheelwrights' work; for fuel this wood is unsurpassed. Dr. Aberg found this species a rival of E. globulus in rapidity of growth, proving one of the best at Buenos Ayres, disseminating itself spontaneously. Mr. O'Shanesy observes that it grows principally on clayey flats in Queensland.

Eucalyptus Raveretiana, F. v. Mueller.

Queensland. A jungle tree of the largest size, attaining a height of 300 feet and 10 feet in diameter; delights in the immediate vicinity of rivers or swamps; vernacularly known as Grey or Iron Gum Tree. It furnishes a very hard, durable, dark-coloured wood, valuable for piles, railway sleepers, and general building purposes (Thozet, O'Shanesy, Bowman). From cuts into the stem an acidulous, almost colourless liquid available in considerable quantity, like that from E. Gunnii.

Eucalyptus redunca, Schauer.

The White Gum Tree of West Australia, the Wandoo of the aborigines; attains very large dimensions; stems have been found with a diameter of 17 feet. The bark is whitish, but not shining, imparting a white coloration when rubbed. The tree is content with cold flats of comparatively poor soil, even where humidity stagnates during the wet season. It furnishes a very pale, hard, tough, heavy, and durable wood, highly prized for all kinds of wheelwrights' work, and especially supplying the best felloes in West Australia. The seasoned timber weighs about 70 lbs. per cubic foot.

Eucalyptus resinifera, Smith.

The Red Mahogany Eucalypt of South Queensland and New

South Wales. A superior timber tree, of large size according to the Rev. Dr. Woolls, the wood being much prized for its strength and durability. It has proved one of the best adapted for a tropical clime, although not so rapid of growth as some other species. It grew 45 feet in ten or twelve years at Lucknow, according to Dr. Bonavia, but in the best soil it has attained 12 feet in two years.

Eucalyptus robusta, Smith.

New South Wales. The timber in use for ship-building, wheelwright's work and many implements, such as mallets, &c.

Eucalyptus rostrata, Schlechtendal.*

The Red Gum Tree of Southern Australia and many river flats in the interior of the Australian continent, nearly always found on moist ground with a clayey subsoil. It will thrive in soil periodically inundated for a considerable time, and even in slightly saline ground. Attains exceptionally a height of 200 feet and a comparatively stout stem, but is mostly of a more spreading habit of growth than the majority of its tall congeners. Mr. R. G. Drysdale, of the Riverina district, observed that an exceptional temperature of 125° F. in the shade did not shrivel the foliage of this tree; it has also withstood the severest heat in Algeria better than E. globulus; and Dr. Bonavia found it to thrive well in the province of Oude in places where E. globulus, E. obliqua, and E. marginata perished under the extreme vicissitudes of the clime. In Mauritius and Réunion it resisted the hurricanes better than any other Eucalypt; in the latter island the Marquis de Chateauvieux observed it to grow 65 feet in 6 years, and it is always found more quickly growing than E. marginata, but less so than E. globulus. It is recommended as an antiseptic tree for cemeteries in tropical countries. The timber among that of Eucalypts is the most highly esteemed in all Australia, being heavy, hard, strong, and extremely durable, either above or under ground, or in water. For these reasons it is highly prized for fence-posts, piles, and railway sleepers; for the latter purpose it will last at least a dozen years, but if well selected much longer; whenever practicable the Government of Victoria has discarded the use of any other timber for railways and bridges in favour of this tree. It is also extensively employed by ship-builders for main-stem, stern-post, inner-post, dead wood, floor-timbers, futtocks, transoms, knighthead, hawse-pieces, cant, stern, quarter and fashion timbers, bottom planks, breast-hooks and riders, windlass, low

rails, etc. It should be steamed before it is worked for planking. Next to the Jarrah from West Australia this is the best Eucalyptus wood for resisting the attacks of the crustaceous chelura and limnoria, the teredo mollusk and white ants. For other details of the uses of this or other Victorian trees, refer to the Reports of the Victorian Exhibitions of 1862 and 1867.

Eucalyptus salmonophloia, F. v. Mueller.

The Salmon-barked Gum-Tree of South-West Australia, attaining a height of 120 feet. The timber is good for fencing, while the foliage is available for profitable oil distillation. The shining white or purplish bark does not give off a white coloration like E. redunca.

Eucalyptus saligna, Smith.

A tall tree, one of the White or Grey Gum-Trees of New South Wales. This species has succeeded best and grown with celerity on the plains of North India. (Dr. Brandis and Dr. Bonavia.)

Eucalyptus salubris, F. v. Mueller.

The Gimletwood or Fluted Gum-Tree of West and Central Australia, living on poor, dry soil. It is generally a slender-stemmed tree, 100 feet high, 2 feet in diameter, with a small crown. The bark is shining with a brownish tinge, and broad, longitudinal, and often twisted impressions, or roundish, blunt, longitudinal ridges. The wood is hard and tough, but comparatively easily worked, heavier than water, even when dry. It serves for roofing, fencing, poles, and shafts, etc. For xylography it is better than Pear-Tree wood and deserves attention for this purpose. The tree exudes kino.

Eucalyptus siderophloia, Bentham.

The Large-leaved or White Iron-Bark Tree of New South Wales and South Queensland, attaining a height of 150 feet. According to the Rev. Dr. Woolls this furnishes one of the strongest and most durable timbers of New South Wales; with great advantage used for railway sleepers and for many building purposes. It is harder even than the wood of E. sideroxylon, but thus also worked with more difficulty. The price of the timber is about 2*s*. 6*d*. per cubic foot in the log. The tree yields much kino.

Eucalyptus Stuartiana, F. v. Mueller.

South-East Australia. A splendid tree, attaining a height of

200 feet, and furnishing a very durable, tough wood, used for building and other purposes. The young stems serve as wagon poles. Dr. Aberg found this to be one of the fastest-growing Eucalypts at Buenos Ayres.

Eucalyptus tereticornis, Smith.*

From East Queensland, where it is termed Red Gum-Tree, to Gippsland, attaining a height of 160 feet. Closely allied to E. rostrata. The timber is esteemed for the naves and felloes of wheels. For telegraph poles and railway sleepers it is inferior to some of the Iron Bark trees, lasting a shorter time, and then not rarely decaying by dry rot. Quite under ground, it remains sound much longer (Thozet), but much depends, as regards its durability, on the locality where it is obtained and the manner of drying.

Eucalyptus terminalis, F. v. Mueller.

The Bloodwood Tree of North Queensland, closely allied to E. corymbosa, attaining a considerable size. The wood is dark red, hard, and extremely tough. Particularly adapted for tropical climes.

Eucalyptus tesselaris, F. v. Mueller.

North Australia and Queensland. Furnishes a brown, rather elastic wood, not very hard, easily worked, of great strength and durability, available for many kinds of artizans' work, and particularly sought for staves and flooring. The tree exudes much astringent gum-resin (P. O'Shanesy). Many other Eucalypts could have been mentioned as desirable for wood culture, but it would have extended this enumeration beyond the limits assigned to it. Moreover, the quality of many kinds is not yet sufficiently ascertained, or not yet fully appreciated, even by the artizans and woodmen. All the Eucalypts are valuable for the production of tar, pitch, acetic acid, potash, and various dye substances.

Eucalyptus viminalis, Labillardière.

South-East Australia. On poor soil only a moderate-sized tree, with a dark rough bark on the trunk, and generally known as Manna Gum-Tree; in rich soil of the mountain forest it attains, however, gigantic dimensions, rising to a height of more than 300 feet, with a stem up to 15 feet in diameter. It has there a cream-coloured, smooth bark, and is locally known as White Gum-Tree. The timber is light-coloured, clear, and though not so strong and durable as that of many other

kinds of Eucalyptus wood, is very frequently employed for shingles, fence-rails, and ordinary building purposes; also for fuel. The fresh bark contains about 5 per cent. kino tannin.

Eucalyptus virgata, Sieber.

One of the Stringy Bark Trees of South-East Australia, often also designated as Mountain Ash. It attains considerable dimensions, and furnishes a useful timber, employed besides ordinary purposes for the staves of casks (Woolls). There are still a good many other Eucalypts in various parts of Australia which grow to a large size, but as they are from districts not much settled, the value of their timber and other properties are not yet sufficiently or not at all known. Thus there may be enumerated E. Abergiana, F. v. Mueller, from North Queensland, apparently a very fine tree; E. Torelliana, F. v. Mueller, mentioned by Mr. Dallachy as the most beautiful Blue Gum-Tree he ever saw; further, E. pellita, F. v. Mueller, closely allied to E. resinifera; E. spinosa, Schauer; E. ptychocarpa, F. v. Mueller; E. ferruginea, Schauer; E. tetrodonta, F. v. Mueller; E. trachyphloia, F. v. Mueller,—all good-sized trees from North-Australia. All notes on the industrial uses of Eucalypts from those who are not exactly acquainted with their scientific names, should be accepted only with great caution, as an inextricable confusion has arisen in the vernacular synonyms, some species being designated by different names in different localities, while sometimes totally distinct species receive the same vernacular appellation.

Euchlæna luxurians, Ascherson.* (*Reeana luxurians,* Durieu.)

The Teosinte. Guatemala, up to considerable elevations. Recommendable as a fodder grass. A large number of stems spring from the same root, attaining a height of a dozen feet or even more. The leaves grow to lengths of 3 feet, and form a good forage. The young shoots when boiled constitute a fair culinary esculent. Dr. Schweinfurth harvested at Cairo from three seeds in one year about 12,000 grains! The fruit required ten months to ripen from the time of sowing; the three seeds furnished ten stalks, each about 18 feet high. The plant, particularly in its young state, is remarkably saccharine. For scenic growth this stately grass is also recommendable. Vilmorin estimates one plant sufficient for two head of cattle during 24 hours. Mons. Thozet, at Rockhampton, obtained plants 12 feet high and 12 feet wide in damp alluvial soil, each with 32 main stalks, bearing nearly 100 flower bunches. *Euchlæna Mexicana* might also be tested.

Euclea myrtina, Burchell.

South Africa. Berry small, black, but edible. To us this plant would hardly be more than an ornamental bush.

Euclea undulata, Thunberg.

South Africa. Berry small, red, edible. Other shrubby species from the same portion of the globe yield also esculent fruits, which under superior culture may vastly improve.

Eucryphia cordifolia, Cavanilles.

The Muermo or Ulmo of Chili. This magnificent evergreen tree attains a height of over 100 feet, producing a stem of sometimes 6 feet in diameter. The flowers are much sought by bees. For oars and rudders the wood is preferred in Chili to any other (Dr. Philippi). We possess congeneric trees in Tasmania (E. Billardièri, J. Hooker) and in New South Wales (E. Moorei, F. v. M.).

Eugenia cordifolia, Wight.

Ceylon, up to 3,000 feet high. Fruit of 1 inch diameter.

Eugenia Hallii, Berg.

Quito. Fruit of large size.

Eugenia maboides, Wight.

Ceylon, up to 7,000 feet elevation. Fruit of the size of a small cherry (Dr. Thwaites).

Eugenia Malaccensis, Linné.

The large Rose Apple. India. Although strictly a tropical tree, it has been admitted into this list as likely adapted for our warmer forest regions. The leaves are often a foot long. The large fruits, of rosy odour, are wholesome and of agreeable taste. E. Jambos, L., also from India, produces likewise excellent fruit.

Eugenia myrtifolia, Sims.

East Australia. A handsome bush with palatable fruits.

Eugenia Nhanica, Cambessedes.

South Brazil. The berries, which are of plum size, are there a table fruit.

Eugenia pyriformis, Cambessedes.

Uvalho do Campo of South Brazil. Fruit of pear size.

Eugenia revoluta, Wight.

Ceylon, up to heights of 6,000 feet; berry 1 inch in diameter.

Eugenia rotundifolia, Wight.

Ceylon, up to 8,000 feet; rejoicing, therefore, in a cool or even cold climate.

Eugenia supra-axillaris, Spring.

The Tata of South Brazil. Fruit large.

Eugenia uniflora, Linné.

Extra-tropical South America. A tree of beautiful habit with edible fruits of cherry size. Dr. Lorentz mentions also as a sub-tropical Argentine fruit species *E. Mato*.

Eugenia Zeyheri, Harvey.

South Africa. A tree attaining 20 feet in height. The berries are of cherry size and edible. The relative value of the fruits of many Asiatic, African, and American species of Eugenia remains to be ascertained; many of them furnish, doubtless, good timber, and all more or less essential oil; some probably also superior fruit. All such, even tropical trees, should be tested in warm tracts of the temperate zone, inasmuch as many of them endure a cooler clime than is generally supposed. Hence Anona muricata, L., the Soursop Bush of West India, should also be subjected to test culture for the yield of its sweet, fragrant, melon-like fruit; and not less so Anona squamosa, L., the Sweetsop Shrub or Tree of Central America, for the sake of its very pleasant fruit.

Eupatorium triplinerve, Vahl. (*E. Ayapana,* Ventenat.)

Central America. A perennial somewhat shrubby herb, possibly hardy in the warmer parts of extra-tropical countries. It is used as a medicinal plant, also as an alexipharmic. It contains eupatorin and much essential oil, peculiar to the plant.

Euryale ferox, Salisbury.

From tropical Asia to Japan. Though less magnificent than the grand Victoria Regia, this closely allied Water Lily is much more hardy, and would live unprotected in ponds and lakes of a temperate climate. Though not strictly an industrial plant,

it is not without utility, and undergoes some sort of cultivation in China for yielding its edible roots and seeds.

Euryangium Sumbul, Kaufmann.

Central Asia. Yields the true Sumbul root.

Euterpe andicola, Brogniart.

Bolivia. Ascends to 9,000 feet (Martius), an altitude higher than is reached by any other Palm (Drude).

Excæcaria sebifera, J. M. (*Stillingia sebifera,* Michaux.)

The Tallow Tree of China and Japan. The fatty coating of the seeds yields the vegetable tallow. The wood is so hard and dense as to be used for printing-blocks; the leaves furnish a black dye. The tree endures slight night frosts, though its foliage suffers.

Fagopyrum cymosum, Meissner.

The perennial Buck Wheat, or rather Beech Wheat, of the Indian and Chinese highlands. Can be used with other species for spinach and for obtaining from the leaves a blue dye.

Fagopyrum emarginatum, Babington.

Chinese and Himalayan Mountains, where it is cultivated for its seeds. Annual.

Fagopyrum esculentum, Moench.

Central Asia. The ordinary Buck Wheat. This annual herb succeeds on the poorest soil. The crushed amylaceous seeds can be converted by boiling or baking into a palatable and wholesome food. As an agrarian plant it can with advantage be raised as a first crop on sandy, not too dry, heath land, newly broken up, for green manure. The period required for the cyclus of its vegetation is extremely short; thus it can be even reared on Alpine elevations.

Fagopyrum Tataricum, Moench.

Middle and North Asia. Yields for the higher mountain regions a still safer crop than the foregoing, otherwise the remarks offered in reference to F. esculentum apply also to F. Tataricum.

Fagopyrum triangulare, Meissner.

In the Himalayan Mountains, ascending naturally to regions 11,500 feet high. An annual. F. rotundatum, Babington,

seems a variety of this species. It is cultivated for food like the rest.

Fagus Cunninghami, Hooker.

The Victorian and Tasmanian Beech. A magnificent evergreen tree, attaining large dimensions and only living in cool, damp, rich forest valleys, not rarely 200 feet high. The wood much used by carpenters and other artizans, the Myrtle-wood of the trade. It requires to be ascertained, by actual tests in the forests, whether the allied tall evergreen New Zealand Beeches possess any advantage over this species for forest culture; they are—Fagus Menziesii (Hooker), the Red Birch of the colonists; Fagus fusca (Hooker), the Black Birch; Fagus Solandri (Hooker), the White Birch. A magnificent beech, Fagus Moorei (F. v. Mueller), occurs in New England.

Fagus Dombeyi, Mirbel.

The Evergreen Beech of Chili, called there the Coigue or Coihue. Of grand dimensions. Canoes out of its stem can be obtained of a size to carry ten tons freight. The wood is still harder than that of the following species, with the qualities of which it otherwise agrees (Dr. Philippi). This species extends to the Chonos group and perhaps still further south, and thus might be of value even for Middle European forest culture.

Fagus ferruginea, Aiton.

North American Beech. Grows there under similar circumstances as our Evergreen Beech here. Well-seasoned wood, according to Simmonds, is extremely hard and solid, hence employed for plane-stocks, shoe-lasts, tool-handles, and various implements and turneries.

Fagus obliqua, Mirbel.

The Roble of Chili, called Coyam by the original inhabitants. A tall tree with a straight stem, attaining 3 to 4 feet diameter. Wood heavy and durable, well adapted for posts, beams, girders, rafters, joists, etc., but not for flooring. One of the few Chilian trees with deciduous foliage (Dr. Philippi). Its value, as compared to that of the European Beech, should in forest plantations be tested.

Fagus procera, Poeppig.

Another deciduous Beech of Chili, where it passes by the

names of Reulé or Rauli. Of still more colossal size than the Roble. Wood fissile, but well adapted for staves; it is finer in grain than that of F. obliqua, and much used for furniture (Dr. Philippi).

Fagus silvatica, Linné.

The deciduous Beech of Britain, of most other parts of Europe and extra-tropical Asia. The trunk has been measured in height 118 feet, the head 350 feet in diameter; the wood is hard, extensively used by joiners and ship-builders and the manufacturers of various implements, especially for planes, shoe-lathes, keys and cogs of machinery, lathe-chucks, gun-stocks, staves, also for carved moulds and for wooden letters in large prints; it is of rather difficult cleavage, great compactness and considerable strength, and resists great pressure. Beech tar contains a considerable proportion of paraffine; the ash from any portion of this tree is rich in phosphate of lime. An allied Beech, Fagus Sieboldii, Endl., occurs in Japan. All these could in the warmer temperate zones be grown to advantage only in springy mountain forests.

Fatsia papyrifera, Bentham. (*Aralia papyrifera*, Hooker; *Panax papyrifer*, F. v. Mueller.)

Island of Formosa. The Rice Paper Plant, hardy in the lowlands of Victoria, and of scenic effect in garden plantations; the pith furnishes the material for the so-called rice-paper, and for solah hats.

Ferula galbaniflua, Boissier.

Persia; on mountains 4,000 to 8,000 feet high. This tall perennial herb might be transferred to Alpine regions, for obtaining locally from it the gum-resin galbanum.

Ferula longifolia, Fischer.

South Russia. The aromatic long roots furnish a pleasant vegetable (Dr. Rosenthal).

Festuca Coiron, Steudel.

Chili. A valuable perennial fodder grass, according to the testimony of Dr. Philippi.

Festuca dives, F. v. Mueller.

Victoria, from West Gippsland to Dandenong and the sources of the rivers Yarra and Goulburn. One of the most magnificent of all sylvan grasses, not rarely 12 feet and exceptionally

to 17 feet high. Root perennial, or perhaps of only two or three years' duration. This grass deserves to be brought to any forest tracts, as it prospers in shade; along rivulets in deep soil it assumes its grandest forms; wants a cool clime. The large panicle affords nutritious forage.

Festuca elatior, Linné.*

The Meadow Fescue. Europe, North Africa, North and Middle Asia. A perennial grass, attaining a height of several feet. There are several varieties of this species. The tallest follows rivers readily as far down as the tides reach. The ordinary form is well adapted for permanent pastures, has tender leaves, produces excellent hay, and is early out in the season. It can be mixed advantageously with F. ovina. It is superior to Rye Grass in produce and improves with age. F. arundinacea, Schreb., F. pratensis, Huds., and F. loliacea, Huds., are varieties of this species.

Festuca flava, F. v. Mueller. (*Poa flava,* Gronov.; *Tricuspis sesleriodes,* Torr.; *Uralepis cuprea,* Kunth.)

The tall Red-top Grass of the Eastern States of North America. A perennial sand-grass, with wide panicles.

Festuca gigantea, Villars.

Europe and Middle Asia. A perennial good forest-grass.

Festuca heterophylla, Lamarck.

Mountains of Europe. This perennial grass attains a height of 5 feet; it produces a proportionately great bulk of fodder, and serves as an admixture to grasses of hay or pasture lands, particularly the former (Lawson). It is best fitted for Alpine forest tracts.

Festuca Hookeriana, F. v Mueller.*

Alps of Australia and Tasmania. A tall perennial grass, evidently nutritious, required to be tried for culture as pasture, and perhaps destined to become a meadow grass of colder countries. It does not readily produce seeds. Stands mowing and depasturing well; much liked by cattle, horses, and sheep (Th. Walton).

Festuca litoralis, Labillardière.

Extra-tropical Australia and New Zealand. An important grass for binding drift sand on sea-shores.

Festuca ovina, Linné.

Sheep Fescue. Europe, North and Middle Asia, North America; found also in South America and the Alps of Australia and New Zealand. This species, like F. elatior, is obtainable with facility. F. duriuscula, L., and F. rubra, L., are varieties. A perennial grass, thriving on widely different soil, even moory and sandy ground. It yields a good produce, maintains its virtue, resists drought, and is also well adapted for lawns and the swards of parks. F. vaginata, Willdenow, is a form particularly recommended by Wessely for sand soil.

Festuca purpurea, F. v. Mueller. (*Uralepis purpurea,* Nuttall; *Tricuspis purpurea,* A. Gray.)

South-east coast of North America. A tufty sand grass, but annual.

Festuca silvatica, Villars.

Middle and South Europe. A notable forest grass. F. drymeia (Mert. and Koch), a grass with long creeping roots, is closely allied. Both deserve test culture.

Festuca spadicea, Linné.

Alps of Europe. This grass would thrive on the heights of snowy mountains. Perennial. The space does not admit of entering here into further details of the respective values of many species of Festuca which might advantageously be introduced from various parts of the globe for rural purposes.

Ficus Carica, Linné.*

Orient. The ordinary Fig Tree. It attains an age of several hundred years. In warm temperate latitudes and climes a prolific tree. The most useful and at the same time the most hardy of half a thousand recorded species of Ficus. The extreme facility with which it can be propagated from cuttings, the resistance to heat, the comparatively early yield and easy culture, recommend the Fig Tree to be chosen, where it is an object to raise masses of tree vegetation in widely treeless landscapes of the warmer zones. Hence the extensive plantations of this tree, made in formerly woodless parts of Egypt; hence the likelihood of choosing the Fig as one of the trees for extensive planting through favourable portions of desert wastes, where, moreover, the fruit could be dried with particular ease. Caprification is unnecessary, even in some instances injurious and objectionable. Two main varieties may be distinguished: that which produces two crops a year, and that

which yields but one. The former includes the Grey or Purple Fig, which is the best, the White Fig and the Golden Fig, the latter being the finest in appearance but not in quality. The main variety, which bears only one crop a year, supplies the greatest quantity of figs for drying, among which the Marseillaise and Bellonne are considered the best. The Barnisote and the Aubique produce delicious large fruits, but they must be dried with fire-heat, and are usually consumed fresh. The ordinary drying is effected in the sun. For remarks on this and other points concerning the Fig, the valuable tract recently published by the Rev. Dr. Bleasdale should be consulted. The first crop of figs grows on wood of the preceding year; the last crop, however, on wood of the current year. Varieties of particular excellence are known from Genoa, Savoy, Malaga, Andalusia.

Ficus columnaris, *Moore and Mueller.*

The Banyan Tree of Lord Howe's Island, therefore extra-tropical. One of the most magnificent productions in the whole empire of plants. Mr. Fitzgerald, a visitor to the island, remarks that the pendulous air-roots, when they touch the ground, gradually swell into columns of the same dimensions as the older ones, which have already become converted into stems, so that it is not apparent which was the parent trunk; there may be a hundred stems to the tree, on which the huge dome of dark evergreen foliage rests, but these stems are all alike, and thus it is impossible to say whence the tree comes or whither it goes. The aerial roots are comparatively rapidly formed, but the wood never attains the thickness of F. macrophylla, which produces only a single trunk. F. rubiginosa also sends air-roots to the ground to form additional trunks (Dr. G. Bennett). The allied Fig Trees of continental East Australia have great buttresses, but only now and then a pendulous root, approaching in similarity the stems of Ficus columnaris. The Lord Howe's Island Fig Tree is more like F. macrophylla than F. rubiginosa; but F. columnaris is more rufous than either. In humid, warm, sheltered tracts, this grand vegetable living structure may be raised as an enormous bower for shade and for scenic ornament. The nature of the sap, whether available for caoutchouc or other industrial material, requires yet to be tested. A substance almost identical with gutta percha, but not like India-rubber, has been obtained by exsiccation of the sap of F. columnaris (Fitzgerald). The hardened sap of this species resembles in many respects that of F. subracemosa and F. variegata, called Getah Lahoe, but differs apparently by its greater solubility in cold alcohol,

and by the portion, insoluble in alcohol, being of a pulverulent instead of a viscid character. The mode of exsiccation affects much the properties of the product.

Ficus Cunninghami, Miquel.

Queensland, in the eastern dense forest regions. Mr. O'Shanesy designates this as a tree of sometimes monstrous growth, the large spreading branches sending down roots, which take firm hold of the ground. One tree measured was 38 feet in circumference at 2 feet from the ground, the roots forming wall-like abutments, some of which extended 20 feet from the tree. Several persons could conceal themselves in the large crevices of the trunk, while the main branches stretched across a space of about 100 feet. A kind of caoutchouc can be obtained from this tree. A still more gigantic Fig Tree of Queensland is F. colossea (F. v. M.), but it may not be equally hardy, not advancing naturally to extra-tropical latitudes. This reminds of the great Council Tree, F. altissima.

Ficus elastica, Roxburgh.*

Upper India, to the Chinese boundary known as far as 28° 30′ north latitude. A large tree, yielding its milk sap copiously for caoutchouc, *i. e.*, the kind called Assam Rubber. Roxburgh ascertained 60 years ago that India-rubber could be dissolved in cajaput oil (so similar to eucalyptus oil), and that the sap yielded about one-third of its weight caoutchouc. This tree is not of quick growth in the changeable and often dry clime of Melbourne, but there is every prospect that it would advance rather rapidly in any unutilised humid forest gullies, and that copious plantations of it there would call forth a new local industry. This tree has grown in Assam to 112 feet with 100 aerial roots in 32 years (Markham). The import of all kinds of caoutchouc into Great Britain during 1874 amounted to 129,168 cwt., worth £1,326,605. Markham and Collins pronounce the caoutchouc of F. elastica not quite so valuable as that of the Heveas and Castilloas of South America. Heat and atmospheric moisture greatly promote the growth of F. elastica. Like most other Fig Trees it is easily raised from seed. A tree of F. elastica is tapped in Assam when 25 years old. After 50 years the yield is about 40 lbs. of caoutchouc every third year (Markham and Collins). Mr. S. Kurz states that F. laccifera (Roxburgh) from Silhet is also a caoutchouc Fig Tree, and that both this and F. elastica yield most in a ferruginous clay soil on a rocky substratum; further, that both can bear dryness, but like shade in youth. Several other species of tropical Figs, American as well as Asiatic, are known

to produce good caoutchouc, but it is questionable whether any of them would prosper in extra-tropical latitudes; nevertheless for the conservatories of Botanic Gardens all such plants should be secured with a view of promoting public instruction.

Ficus Indica, Linné.

The Banyan Tree of India, famed for its enormous expansion and air roots. Although not strictly an utilitarian tree, it is admitted here as one of the most shady trees, adapted for warm and moist regions. At the age of 100 years one individual tree will shade and occupy about one and a half acres, and rest on 150 stems or more, the main stem often with a circumference of 50 feet, the secondary stems with a diameter of several feet. At Melbourne the tree suffers somewhat from the night frosts.

Ficus infectoria, Willdenow.

India, ascending to 5,000 feet. Probably hardy, and then adapted for street planting. Brandis and Stewart found its growth quicker than that of Siris or Albizzia procera. F. religiosa (L.) ascends to the same height, and is in moist climates of quick growth. It is one of the trees on which the lac insect largely exists. The fruits of some huge Himalayan species—for instance, F. virgata (Roxb.), F. glomerata (Roxb.), F. Roxburghii (Wallich)—are edible.

Ficus macrophylla, Desfontaines.*

The Moreton Bay Fig-Tree, which is indigenous through a great part of East Australia. Perhaps the grandest of Australian avenue trees, and among the very best to be planted, although in poor dry soil its growth is slow. In the latitude of Melbourne it is quite hardy in the lowland. The foliage may occasionally be injured by grasshoppers. Easily raised from seed.

Ficus rubiginosa, Desfontaines.

New South Wales. One of the most hardy of all Fig Trees, and very eligible among evergreen shade trees. It is estimated that the genus Ficus comprises about 600 species, many occurring in cool mountain regions of tropical countries. The number of those which would endure a temperate clime is probably not small.

Ficus Sycamorus, Linné.

The Sycamore Fig Tree of the Orient, copiously planted along

the roadsides of Egypt. The shady crown extends to a width of 120 feet. Attains an enormous age. A tree at Cairo, which legends connect with Christ, still exists. Seven men with outstretched arms could hardly encircle the stem.

Fitzroya Patagonica, J. Hooker.*

Chili, as far south as Chiloe. The Alerce of the Chilians. Grows on swampy, moory places. A stately tree, 100 feet high. The diameter of the stem reaches sometimes the extraordinary extent of 15 feet. The wood is almost always *red, easily split, light, does not warp, stands exposure to the air* for half a century, and in Valdivia and Chiloe almost all buildings are roofed with shingles of this tree (Dr. Philippi). The outer bark produces a strong fibre, used for caulking ships. Like Libocedrus tetragona, this tree should be extensively planted in unutilised swampy moors in the mountains.

Flacourtia Ramontchi, l'Heritier. (*F. sapida,* Roxburgh.)

India up to Beloochistan. This and F. cataphracta (Roxb.) form thorny trees with somewhat plum-like fruits. With other species they can be adopted for hedge copses.

Flemingia tuberosa, Dalzell.

Western India. The tubers of this herb are said to be edible. Another species, F. vestita, is on record as cultivated in North-Western India for its small esculent tubers.

Flindersia australis, R. Brown.

New South Wales and Queensland. With *Araucaria Cunninghami* and *Ficus Camerana,* the tallest of all the jungle trees of its localities, attaining 150 feet. Bark scaly, stem with a diameter to 8 feet. Timber of extraordinary hardness (Ch. Moore). A noble tree for avenues. Rate of growth, according to Mr. Fawcett, about 25 feet in eight years.

Flindersia Oxleyana, F. v. Mueller.

The Yellow Wood of New South Wales and Queensland. Its wood used for staves as well as that of F. australis, Tarrietia argyrodendron, Stenocarpus salignus, Castanospermum australe. Mr. Hartmann mentions that F. Oxleyana attains a height of 150 feet and supplies one of the finest hard woods for choice cabinet-work. Other species occur there, among which F. Bennettiana is the best for avenue purposes.

Flueggea Japonica, C. Richard.

China and Japan. The mucilaginous tubers can be used for

food—a remark which applies to many other as yet disregarded liliaceous plants.

Fœniculum officinale, Allioni.

The Fennel. Mediterranean regions, particularly on limestone soil. A perennial or biennial herb, of which two primary varieties occur, the so-called sweet variety having fruits almost twice as large as the other. The herb and fruits are in use as condiments and the latter also for medicine. The fruits are rich in essential oil, containing much anethol.

Fourcroya Cubensis, Haworth.

West India and continental tropical America. A smaller species than the following, but equally utilised for fibre and impenetrable hedges. F. flavo-viridis (Hooker), from Mexico, is still smaller.

Fourcroya gigantea, Ventenat.

Central America. With species of Yucca, Agave, Dracæna, Cordyline, Phormium, Doryanthes, and this and a few other Fourcroyas, we have gigantic liliaceous plants available industrially for fibre. Frost injures the leaves of this species. Development of flower stalk extremely rapid, up to 30-feet high. Fibre often 3 feet long and of considerable tenacity. The fibre produced in Mauritius by Messrs. Bourgignon and Fronchet proved stronger than hemp and resisted decay in water.

Fourcroya longæva, Karw. and Zucc.

High mountains of Guatemala and Mexico, at an elevation of about 10,000 feet. One of the most gigantic and magnificent of all liliaceous or amaryllideous plants, in volumen only surpassed by Dracæna Draco, the Dragon Tree of the Canary Islands. This is the only known high-stemmed species, the trunk attaining a height of 50 feet, and huge panicle of flowers 40 feet more. It dies, like many allied plants, after flowering. The species is recorded here as a fibre-plant, but should also be cultivated for its ornamental grandeur.

Fragaria Chiloensis, Aiton.

In various of the colder parts both of North and South America. Chili Strawberry.

Fragaria collina, Ehrhart.

In various parts of Europe. Hill Strawberry.

Fragaria grandiflora, Ehrhart. (*F. Ananas,* Miller.)
Various colder parts of America. Closely allied to F. Chiloensis. Ananas Strawberry.

Fragaria Illinoensis, Prince.
North America. Hovey's Seedling and the Boston kind from this plant.

Fragaria pratensis, Duchesne. (*Fragaria elatior,* Ehrhart.)
In mountain forests of Europe. Cinnamon Strawberry. Hautbois.

Fragaria vesca, Linné.
Naturally very widely dispersed over the temperate and colder parts of the northern hemisphere. Wild Wood Strawberry. From this typical form probably some of the other Strawberries arose. Middle forms and numerous varieties now in culture were produced by hybridisation. These plants, though abounding already in our gardens, are mentioned here, because even the tenderest varieties could be naturalised in our ranges. Any settler, living near some brook or rivulet, might readily set out some plants, which, with others similarly adapted, would gradually spread with the current.

Fragaria Virginiana, Miller.
North America. Scarlet Strawberry.

Fraxinus Americana, Linné.*
The White Ash of North America. A large tree more than 80 feet high, which delights in humid forests. Trunks have been found 75 feet long without a limb and 4½ feet in diameter (Emerson). It is the best of all American Ashes, of comparatively rapid growth. Timber valuable, better resisting extreme heat than the common Ash; largely exported. It assumes a red tint in age. Much valued for its toughness and elasticity, excellent for work subject to sudden shocks and strains, such as the frames of machines, carriage wheels, agricultural implements, hand-picks, billiard cues, fishing-rods, handles, chair rails, shafts, staves, pulley blocks, belaying-pins, and oars, also for furniture, the young branches for mast hoops. Over-old wood not desirable. When once thoroughly seasoned, it does not shrink or swell, and is thus in Virginia preferred for flooring to any native timber (Robb; Simmonds). The inner bark furnishes a yellow dye. The Red Ash (Fraxinus pubescens, Lam.), the Green Ash (F. viridis, Mich.), the

Black Ash (F. sambucifolia, Lam.), and the Carolina Ash (F. platycarpa, Mich.) are of smaller size.

Fraxinus Chinensis, Roxburgh.

It is this Ash on which a peculiar wax is produced by Coccus Pela, perhaps also on some species of Ligustrum. About 40,000 lbs. are exported annually according to Mr. Bernardini.

Fraxinus excelsior, Linné.

The ordinary Ash of Europe and West Asia. Height 80 feet, of comparatively quick growth, known to attain an age of nearly 200 years. Rich soil on forest rivulets or river banks suits it best; but it thrives still on moist sand; wood remarkably tough and elastic, used for agricultural and other implements, for oars, axletrees, and many other purposes. Six peculiar kinds of Ash trees occur in Japan, some also in the Indian highlands; all might be tried.

Fraxinus floribunda, Don.

Nepal Ash, 40 feet high. Himalaya, between 5,000 and 11,000 feet. It attains a height of 120 feet, and serves as a fine avenue tree; girth of stem sometimes 15 feet. The wood much sought for oars, ploughs, and various implements (Stewart and Brandis). For forest plantations Ashes are best mixed with Beeches and some other trees.

Fraxinus Oregana, Nuttall.

California and Oregon Ash. A tree up to 80 feet in height, preferring low-lying alluvial lands. The wood of this fine species is nearly white, tough and durable, often used for oars and handles of implements. Though allied to F. sambucifolia, it is very superior as a timber tree. Ash trees will grow readily in the shade of other trees.

Fraxinus Ornus, Linné.*

The Manna Ash of the Mediterranean regions. Height about 30 feet. It yields the medicinal manna. F. ornus is well adapted for a promenade tree, and is earlier in foliage than F. excelsior, F. Americana, and most other Ash trees.

Fraxinus quadrangulata, Michaux.*

The Blue Ash of North America. One of the tallest of the Ashes, 70 feet high, with an excellent timber, better than that of any other American Ash trees except the White Ash, hence frequently in use for flooring and shingles. The inner bark

furnishes a blue dye. The tree wants the mildest of climes and the most fertile soil.

Fraxinus sambucifolia, Lamarck.

Black or Water Ash of North America. Attains a height of 80 feet. Wood still more tough and elastic than that of *F. Americana,* but less durable when exposed. The wood is comparatively rich in potash, like that of most congeners. For oars and implements it is inferior to that of the White Ash (Simmonds).

Fraxinus viridis, Michaux.

The Green Ash of North America. Height 70 feet; wood excellent, nearly as valuable as that of the White Ash, but of less dimensions. The tree requires wet, shady woodlands.

Frenela columellaris, F. v. Mueller.

East Australia, on bare sandy coast tracts. Height up to 70 feet. Timber durable, fine-grained, fragrant, capable of a high polish; used for piles of wharves and sheeting of punts and boats; it resists the attacks of chelura and white ants; the roots are valued for veneers. The wood is also used for telegraph posts according to Mr. Thozet. Present market value £6 per 1,000 superficial feet. (Queensland Exhibition, 1878.)

Frenela Macleayna, Parlatore.

New South Wales. A handsome tree, of regular pyramidal growth, attaining a height of 70 feet; the timber is valuable.

Frenela Parlatorei, F. v. Mueller.

South Queensland. Recommended by Mr. F. M. Bailey as a shade tree. It attains a height of 60 feet. Several other Frenelas are worthy of forest culture.

Frenela verrucosa, A. Cunningham.

Through the greater part of Australia. Also several other species from Victoria and other parts of Australia are among the trees which may be utilised for binding the coast and desert sand. They all exclude Sandarac. F. Endlicheri, Parlatore, a very ornamental and graceful tree, attains according to Hartmann a height of 100 feet, and supplies a beautiful wood suitable for cabinet-making. Frenela wood is of a dark colour.

Garcinia Travancorica, Beddome.

Madras Presidency, up to elevations of 4,500 feet. This

seems to be the hardiest of the superior Gamboge trees; hence there is some prospect of its prospering in forests of the warmer temperate zone.

Garuleum bipinnatum, Lessing.

South Africa. A perennial herb of medicinal properties, and, like numerous other plants there and elsewhere, praised as an alexipharmic, but all requiring close re-investigation in this respect.

Gaultiera Myrsinites, Hooker.

North California, Oregon, British Columbia. The fruit of this procumbent shrub is said to be delicious. It would prove adapted for our Alps.

Gaultieria Shallon, Pursh.

North-Western America. This handsome spreading bush would yield its pleasant edible berries in abundance if planted on our snowy mountains, where it would likely become naturalised.

Gaylussacia frondosa, Torrey and Gray.

The Blue Tangleberry of North America. A bush with deciduous foliage. Berry sweet.

Gaylussacia resinosa, Torrey and Gray.

The Black Huckleberry of North America. A dwarf shrub with deciduous leaves. It likes swampy woodlands, and thus would find ample space in our forest ranges. Berry of pleasant taste. Perhaps some of the South American species produce also edible fruits.

Geitonoplesium cymosum, Allan Cunningham.

Through the whole East Australian forests. It is mentioned here to draw attention to the fact that special culture may convert this into an Asparagus plant, as Mr. P. O'Shanesy has found that the young shoots offer a fair substitute for Asparagus.

Gelsemium nitidum, Michaux.

Southern States of North America and Mexico. A twining shrubby plant of medicinal value, long since introduced into Australia by the writer, like numerous other plants of industrial or therapeutical importance. Active principle: gelsemin. The scent of the flowers has also come into use as a cosmetic.

Genista monosperma, Lamarck.

Mediterranean regions. One of the best of Broom bushes for arresting sand drift. G. sphærocarpa, Lamarck, is of like use, and comes also from the Mediterranean Sea.

Gentiana lutea, Linné.

Sub-Alpine tracts of Middle and South Europe. A perennial most beautiful herb, yielding the medicinal gentian root. It could be easily raised in our higher mountains. Chemical principles: gentian-bitter and gentianin.

Geonoma vaga, Grisebach and Wendland.

From West India to Brazil. A dwarf decorative Palm, advancing up to 3,000 feet on the mountains.

Geum urbanum, Linné.

Europe, North Africa, extra-tropical and Alpine Asia, South-East Australia, North America. The "Avens" of Britain. A perennial herb with a powerful anti-dysenteric root, which, according to Muspratt, contains up to 41 per cent. of tannic acid.

Gigantochloa apus, Kurz. (*Bambusa apus,* Roemer and Schultes.)

Indian Archipelagus, at elevations up to 5,000 feet. Height of stem to 60 feet. When young, it is used for strings and ropes.

Gigantochloa aspera, Kurz.

Java. Found by Zollinger to attain a maximum height of 170 feet.

Gigantochloa atter, Kurz.

Java, in the region from 2,000 to 4,000 feet. Height of stems to 70 feet. One of the extensively cultivated species.

Gigantochloa maxima, Kurz.

Java. Height to 120 feet, the stems nearly a foot thick. One of the most extensively cultivated of all Asiatic bamboos, ascending into mountain regions.

Gigantochloa nigro-cilliata, Kurz. (*Oxytenanthera nigrociliata,* Munro.)

Continental and insular India. Stems to 130 feet long.

Gigantochloa robusta, Kurz.

Mountains of Java. Height to 100 feet. Kurz noticed in

Java the early growth to be nearly 18 feet in a month, the principal branches only commencing when the shoot had reached a height of about 70 feet. Some Java bamboos are known to measure, at a height of about 120 feet, 22 inches in girth.

Gigantochloa verticillata, Munro. (*Bambusa verticillata,* Blume.)
The Whorled Bamboo of India. It attains a height of 100 feet; in damp heat it grows at the astonishing celerity of 40 feet in about three months, according to Bouché. The young shoots furnish an edible vegetable like G. Apus and Bambusa Bitung.

Ginkgo biloba, Linné. (*Salisburia adiantifolia,* Smith.)
Ginkgo Tree. China and Japan. A deciduous fan-leaved tree, 100 feet high, with a straight stem 12 feet in diameter. The wood is white, soft, easy to work, and takes a beautiful polish. The seeds are edible, and when pressed yield a good oil. The fruits, sold in China under the name of "Pa-Koo," not unlike dried almonds, but white, fuller, and rounder (Fortune). Ginkgo trees are estimated to attain an age of 3,000 years. Mr. Christy observes that the foliage turns chrome yellow in autumn, and that it is the grandest and most highly esteemed of all trees in Japan; it will grow in dry situations.

Gladiolus edulis, Burchell.
Interior of South Africa. The bulb-like roots are edible, and taste like chestnuts when roasted.

Gleditschia triacanthos, Linné.
The deciduous Honey Locust-Tree of North America. Height up to 80 feet. Wood hard, coarse-grained, fissile, not without importance for street planting. Sown closely, this plant forms impenetrable, thorny, not readily combustible hedges. An allied species, the G. horrida, Willd., in East Asia. The Water Locust-Tree of North America (G. monosperma, Walt.) will grow in swamps to 80 feet.

Glycine hispida, Bentham. (*Soja hispida,* Mœnch.)
An annual herb of India, China, and Japan. The beans are one of the main ingredients of the condiment known as Soja. Glycine Soja, Siebold and Zuccarini, is said to be a distinct plant, but probably serving the same purpose.

Glycyrrhiza echinata, Linné.

South Europe and Orient. From the root of this herb at least a portion of the Italian liquorice is prepared. The root is thicker than that of the following. The Russian liquorice root is derived from this species. It is less sweet.

Glycyrrhiza glabra, Linné.

South Europe. The extract of the root of this herb constitutes the ordinary liquorice. The plant grows most vigorously in Victoria. The liquorice is of some utility in medicine, but also used in porter breweries. Chemical principle: glycyrrhizin.

Gonioma Kamassi, E. Meyer.

South Africa. This small tree furnishes the yellow Kamassi-wood, much sought for carpenters' tools, planes, and other select articles of wood-work; also for wood-engraving, according to Dr. Pappe. Flowers deliciously fragrant.

Gordonia lasianthus, Linné.*

The Loblolly Bay. North America. A handsome tree, growing to a height of 60 feet; flowers snowy white. The wood is extremely light, of a rosy hue and fine silky texture, but unfit for exposure. The bark is extensively employed for tanning in the Southern States. Available for swampy coast lands.

Gossypium arboreum, Linné.*

The Tree Cotton. India, Arabia. A tall perennial species, but not forming a real tree, yielding cotton in the first season. Leaves long-lobed. Bracts with few teeth. Petals yellow, or in age pink or purple. Seeds brown, disconnected, after the removal of the cotton fibre greenish velvety. The cotton of long staple, but a variety occurs with short staple. The New Orleans Cotton (G. sanguineum, Hassk.) belongs to this species. Dr. Seemann connects also the ordinary G. herbaceum, L., as a variety with G. arboreum. The cotton fibre is crisp, white, opaque, and not easily separable.

Gossypium Barbadense, Linné.*

West India. Sea Island Cotton. Leaves long-lobed. Petals yellow. Seeds disconnected, black, after the removal of the cotton fibre naked. The cotton of this species is very long, easily separable, and of a silky lustre. This species requires

low-lying coast tracts for attaining to perfection. Perennial, and yielding like the rest a crop in the first season. Cultivated largely in the Southern States of North America, also in South Europe, North Africa, Queensland, and various other countries. M. Delchevalerie has drawn attention to a new and almost branchless plant, of tall size and exceedingly prolific in bearing, raised in Egypt, called Bamia Cotton, which Sir Joseph Hooker regards as a variety of G. Barbadense. The Bamia Cotton Bush grows 8 to 10 feet high, ripens (at Galveston) fruit in four to five months, and produces 2,500 lbs. cotton and seed per acre. It is remarkable for its long simple branches, heavily fruited from top to bottom. Its cotton is pale yellow.

Gossypium herbaceum, Linné.*

Scinde, Cabul, and other parts of tropical and sub-tropical Asia. Much cultivated in the Mediterranean countries. Perennial. Leaves short-lobed. Petals yellow. Seeds disconnected, after removal of the cotton fibre grey-velvety. Distinguished and illustrated by Parlatore as a species, regarded by Seemann as a variety of G. arboreum. Staple longer than in the latter kind, white opaque, not easily seceding. Even this species, though supposed to be herbaceous, will attain a height of 12 feet. The root is a powerful emmenagogue. A variety with tawny fibre furnishes the Nankin cotton.

Gossypium hirsutum, Linné.*

Upland or Short-staple Cotton. Tropical America, cultivated most extensively in the United States, Southern European and many other countries. Perennial. Seeds brownish green, disconnected, after the removal of the cotton fibre greenish velvety. Staple long, while, almost of a silky lustre, not easily separable. A portion of the Queensland cotton is obtained from this species. It neither requires the coast tracts nor the highly attentive culture of G. Barbadense.

Gossypium religiosum, Linné.* (*G. Peruvianum*, Cavan.)

Tropical South America. Kidney Cotton, Peruvian or Brazilian Cotton. Leaves long-lobed. Petals yellow. Seeds black, connected. The cotton is of a very long staple, white, somewhat silky, and easily seceding from the seeds. A tawny variety occurs. This is the tallest of all cotton bushes, and it is probably this species which occurs in the valleys of the Andes as a small tree, bearing its cotton while frosts whiten the ground around.

Gossypium Taitense, Parlatore. (*G. religiosum,* Banks and Solander.)

In several islands of the Pacific Ocean. A shrub. Petals white. Seeds disconnected, glabrous after the removal of the fulvous cotton fibre, which secedes not with readiness.

Gossypium tomentosum, Nuttall.* (*G. Sandvisense,* Parlatore; *G. religiosum,* A. Gray.)

Hawaia. Perennial. Petals yellow. Seeds disconnected, after the removal of the tawny cotton-fibre fulvous velvety, not easily parting with their cotton. The cotton roots are a powerful remedial agent, which, however, should only be used in legitimate medical practice. The barks of Hamamelis Virginiana and Viburnum prunifolium are antidotes (Phares and Durham).

For limitation of species and varieties Parlatore's "Specie dei Cotoni" (Florence, 1866) and Todaro's "Osservazioni su Cotone" may be consulted; information on culture may be sought in Porter's "Tropical Agriculturist" and in Mallet's work on "Cotton" (London, 1862).

The following notes were written for the use and guidance of Victorian colonists:—

There are many parts of our colony in which all these species of Gossypium could be cultivated, and where a fair or even prolific cotton crop may be obtained. Good cotton, for instance, has been produced on the Goulburn River, the Loddon, the Avoca, and the Murray Rivers, particularly in places where water could be applied. All cultivated kinds of cotton plants are either naturally perennials or become such in favourable climes, although they may be treated strictly as annuals. Some of them will indeed in particular instances grow to the height of 20 feet. The geographic parallels, between which cotton culture is usually placed, stretch in various girdles between 36° north latitude and 36° south latitude. According to General Capron, cotton is grown in Japan to 40° north latitude, but superior quality is not obtained north of 35°.

All cotton culture in the Southern States of North America came to 7 million acres before the civil war, cultivated by 1½ million negroes; India has now 14 million acres cotton. The primary advantages of this important culture are: a return in a few months, comparatively easy field operations, simple and not laborious process of collecting the crop, and requirement of but little care in the use of the gin machine in finally preparing the raw material for the market, the woolly covering of

the seeds constituting the cotton of commerce. The oil obtained by pressure from the seeds is useful for various technic purposes, and the oil-cake can be used like most substances of similar kind for very fattening stable food. Sea Island cotton was raised in splendid perfection in the northern parts of Victoria fully twenty years ago from seeds extensively distributed by the writer; but the want of cheap labour has hitherto militated against the extensive cultivation of the cotton, and so also against the culture of tea and many other industrial plants. Cotton having been raised far away from the influence of the sea air, it would be worthy of attempts to naturalise various kinds of cotton in the oases of our deserts, irrespective of regular culture. Our native Gossypiums of the interior produce no fibre worth collecting. Cotton plants have a predilection for gently undulating or sloping ground, with light soil and a moderate supply of moisture. In the most favourable climes, such as that of Fiji, cotton produces flowers and fruits throughout the year, but the principal ripening falls in the dry season. From two hundred to three hundred plants or more can be placed on an acre. As many as seven hundred pods have been gathered from a single plant at one time, twelve to twenty capsules yielding an ounce of mercantile cotton. Weeding is rendered less onerous by the vigorous growth of the plants. Cotton comes well in for rotation of crops. Major Clarke has ascertained that crossing cannot be effecte dbetween the oriental and occidental kinds of cotton. A high summer temperature is needed for a prolific cotton harvest. Intense heat, under which even maize will suffer, does not injuriously affect cotton, provided the atmosphere is not dry in the extreme. The soil should not be wet, but of a kind that naturally absorbs and retains humidity, without oversaturation. In arid regions it is necessary to irrigate the cotton plant. Heavy rains at the ripening period are injurious, if not destructive, to the cotton crop. Dry years produce the best returns, yet aqueous vapour in the air is necessary for the best yield. In colder localities the balls or capsules continue to ripen after the frosts prevent the formation of new ones. Porous soils resting on limestones and metamorphic rocks are eminently adapted for cotton culture. The canebrake soil of the North American cotton regions absorbs ammonia to a prodigious extent.

Gourliaca decorticans, Grisebach.

The Chañar of Argentina. Bears sweet pleasant fruits and yields a tough valuable wood (Dr. Lorentz).

Grevillea annulifera, F. v. Mueller.

West Australia. A tall bush or small tree, with highly ornamental flowers. The seeds are comparatively large, of almond taste, and the fruits produced copiously. The shrub will live in absolute desert sands, where the other Australian proteaceous Nut Tree *Brabejum* (*Macadamia*) *ternifolium* could not exist.

Grevillea robusta, Cunningham.

A beautiful Lawn Tree, indigenous to the sub-tropical part of East Australia, 150 feet high, of rather rapid growth, and resisting drought in a remarkable degree; hence one of the most eligible trees for desert culture. Cultivated trees at Melbourne yield now an ample supply of seeds. The wood is elastic and durable, valued particularly for staves of casks.

Guadua angustifolia, Kunth. (*Bambusa Guadua,* Humboldt and Bonpland.)*

New Granada, Ecuador, and probably others of the Central American States. This bamboo attains a height of 40 feet, and might prove hardy in sheltered places of temperate lowlands. Holton remarks of this species that it is, after the plantain, maize, and cane, the most indispensable plant of New Granada, and that it might be called the Lumber Tree, as it supplies nearly all the fencing and wood-work of most of the houses, and is besides manufactured into all kinds of utensils.

Guadua latifolia, Kunth. (*Bambusa latifolia,* Humboldt and Bonpland.)*

One of the tall Bamboos of Central America, from whence several other lofty bamboos may be obtained, among them the almost climbing Chusqueas. This Guadua is stouter than any Indian Bamboo. In tropical America native bamboos are planted for hedges.

Guevina Avellana, Molina. (*Quadria heterophylla,* Ruiz and Pavon.)

The evergreen Hazel Tree of Chili, extends from Middle Chili to the Chonos Archipelagus. One of the most beautiful trees in existence, attaining a height of 30 feet. The snowy white flower-spikes produced simultaneously with the ripening of the coral-red fruit. In the cooler southern regions the tree attains considerable dimensions. The wood tough and elastic, used for boat-building (Dr. Philippi). The fruit of the allied Brabejum stellatifolium can only be utilised with caution and in a roasted

state as an article of diet, because it is noxious or even absolutely poisonous in a raw state.

Guilandina Bonduc, Linné.

Widely dispersed through the intertropical regions of both hemispheres with G. Bonducella, L. Both would be well adapted for hedges in the warmer parts of the temperate zone.

Guizotia oleifera, Candolle.

India and probably also Abyssinia. The Ramtil oil is pressed from the seeds of this annual herb, which yields its crop in three months. The oil is much used like Sesamum oil, for culinary as well as for technic purposes.

Gunnera Chilensis, Lamarck.

Caracas to Patagonia, chiefly on cliffs. A most impressive plant for scenic groups in gardens. Darwin measured leaves 8 feet broad and 24 feet in circumference. The acidulous leaf-stalks serve as a vegetable; the thick roots are used for tanning and dyeing. G. macrophylla, Blume, is a native of Java and Sumatra, where it occurs on mountains up to 6,000 feet.

Gymnocladus Canadensis, Lamarck.

The Chicot. A North American timber and avenue tree, attaining a height of 80 feet; allied to Gleditschia, but, as the name implies, thornless. Delights in rich soil and a sheltered position. Can be raised from cuttings of the roots. The wood is strong, tough, compact, fine-grained, and assumes a rosy colour. The pods preserved like those of Tamarinds are said to be wholesome (Simmonds).

Hagenia Abyssinica, Willdenow. (*Brayera anthelminthica,* Kunth.)

Abyssinia, at elevations from 3,000 to 8,000 feet. A tall tree, admitted in this list because its flowers have come into medicinal use. It is, moreover, quite eligible for ornamental plantations.

Hardwickia binata, Roxburgh.

India up to elevations of nearly 4,000 feet. Maximum height of tree 120 feet. Wood from red-brown to nearly black, close-grained, exceedingly hard, heavy and durable; valued for underground work. The bark furnishes easily a valuable

material for cordage. The tree can readily be pollarded for cattle fodder (Brandis).

Harina caryotoides, Roxburgh.

Assam, Chittagong, and Darjeeling. A dwarf, tufted, hardy Palm, desirable for decorative purposes.

Harpullia Hillii, F. v. Mueller.

The Tulip Wood of Queensland. One of the most valuable of the numerous kinds of trees indigenous there for select cabinet-work. H. pendula (Planchon) is equally valuable.

Hedeoma pulegioides, Persoon.

The Penny-royal of North America. An annual herb of aromatic taste, employed in medicine. The volatile oil is also in use.

Hedysarum coronarium, Linné.*

The Soola Clover. South Europe. One of the best of perennial fodder herbs. It carries with it also the recommendation of being extremely handsome.

Heleocharis tuberosa, Roemer and Schultes.

China, where it is called Matai or Petsi. This rush can be subjected to regular cultivation in ponds for the sake of its edible wholesome tubers. H. plantaginea and H. fistulosa of India and the Australian H. sphacelata are allied plants.

Helianthus annuus, *Linné.**

The Sun Flower. Peru. This tall, showy, and large-flowered annual is not without industrial importance. As much as fifty bushels of seeds, or rather seed-like nutlets, have been obtained from an acre under very favourable circumstances, and as much as fifty gallons of oil can be pressed from such a crop. The latter can be used not only for machinery, but even as one of the best for the table; also used for superior toilet soaps and for painting; it belongs to the series of drying-oils. Otherwise the seeds afford an excellent fodder for fowl; also used for cakes. The leaves serve for fodder and the seeds as a substitute for coffee according to Professor Keller. The large flower-heads important as yielding much honey. The stalks furnish a good textile fibre, and the blossoms yield a brilliant, lasting yellow dye. About six pounds of seeds are required for an acre. The plant likes calcareous soil. Important also for raising quickly vegetation around fever

morasses, the absorbing and exhaling power of this plant being very large (Dr. v. Hamm). A Sun Flower, according to Lacoppidan, will exhale 1½ lbs. of water during a hot day. Several allied North American species deserve rural culture. The return from a Sun Flower field is attained within a few months.

Helianthus tuberosus, Linné.*

Brazil. Sun Flower Artichoke. Inappropriately passing under the name "Jerusalem Artichoke," instead of "Girasol Artichoke." The wild state, according to Professor Asa Gray, seems the North American H. doronioides, Lamarck. The tubers are saccharine and serve culinary purposes. As a fodder they increase the milk of cows to an extraordinary degree. The foliage serves well, also, as fodder. The plant is propagated from the smallest but undivided tubers, placed like potatoes, but at greater interstices. The root is not susceptible to frost. The plant would be valuable for Alpine regions. The yield is as large as that of potatoes, with less labour, and continues from year to year in fairly-treated land, uninterruptedly and spontaneously. The stem is rich in textile fibre. The percentage of crystalline sugar is largest during the cold season, namely, 5-6 per cent. During the summer the starch-like inulin prevails. This plant can only be brought to full perfection in a soil rich in potash.

Helichrysum lucidum, Henckel. (*H. bracteatum*, Willdenow.)

Throughout the greater part of Australia. The regular cultivation of this perennial herb would be remunerative to supply its everlasting flowers for wreaths, just like those of H. orientale, Tournefort, from Candia, are largely grown and sold in South Europe to provide grave-wreaths. Furthermore, the lovely Helipterum Manglesii, F. v. M., from West Australia, could, for the like purposes, be profitably reared on a large scale with several other Australian everlastings. Some South African species of Helichrysum and Helipterum are also highly eligible for these purposes of decoration.

Heliotropium Peruvianum, Linné.

Andes of South America. A perennial somewhat shrubby plant. Among various species of Heliotrope this one can best be utilised for the distillation of the scented oil.

Helleborus niger, Linné.

Forest mountains of Middle and South Europe. The Christmas

Rose of British Gardens. A perennial handsome herb. The roots are used in medicine.

Helvella esculenta, Persoon.

Europe. Dr. Geoppart notes among saleable Silesian mushrooms for table use this species as well as *H. gigas* (Krombholz), *H. infula* (Fries).

Hemarthria compressa, R. Brown.

South Asia, South Africa, extra-tropical Australia. This perennial, though somewhat harsh grass, is recommendable for moist pastures, and will retain a beautiful greenness throughout the year, very highly esteemed by graziers in Gippsland (Victoria); it is not injured by frost. H. uncinata is a closely allied plant, which grows down to high-water mark on estuaries of rivers; also otherwise on somewhat saline ground.

Heracleum Sibiricum, Linné.

Colder regions of Europe and Asia. A very tall biennial herb with leaves of enormous size. Recently recommended for sheep fodder in the Alpine regions. This plant could also be turned to account for scenic effect in horticulture.

Heterothalamus brunioides, Lessing.

South Brazil and Argentina. A dwarf shrub, furnishing the yellow Romerillo dye from its flowers.

Hibiscus cannabinus, Linné. (*H. radiatus*, Cavanilles.)

Tropical Asia, Africa, and Australia. An annual showy herb. The stem yields a hemp-like fibre. Stems up to 12 feet high without ramification if closely sown. Rich soil on the Nile has yielded over 3,000 lbs. of clear fibre from one acre. The bearing strength is often found to be more than that of the Sun fibre. The leaves serve as sorrel spinach. Several other Hibisci can be utilised in the same manner. Good fibre is also obtained from Sida rhombifolia, L.

Hibiscus esculentus, Linné.

West India and Central America. A tall herb. The mucilaginous seed capsules are known as Ochro, Bandakai, or Gobbo, and used as culinary vegetables. The summers of Victoria bring them to maturity. The Ochro can be preserved by being dried either in the sun or by artificial heat after

previous slicing. The leaves of this and allied species can be used as pot-herbs.

Hibiscus Ludwigii, Ecklon and Zeyher.

South Africa. A tall, shrubby, and highly ornamental species, desirable also as yielding a fibre of great strength and toughness.

Hibiscus Sabdariffa, Linné.

Tropical Asia and Africa. A showy annual plant, occasionally of more than one year's duration, admitting of its culture in the warmer temperate regions; it is, however, cut down by frost. It yields the Rosella fibre. The acidulous calyces furnish a delicious sorrel and rosella jellies, particularly relished in hot climes. *H. punctatus* (Dalz. & Gibs.) is mentioned as an annual fibre plant, occurring in Sindh and Mooltan.

Hierochloa redolens, R. Brown.

South-Eastern Australia, almost confined to the Alps; in Tasmania and New Zealand, also found in the lowlands, occurring likewise in the antarctic islands and the southern extremity of America. A tall, perennial, nutritious grass, with the odour of Anthoxanthum. It is worthy of dissemination on moist pasture land. H. borealis of the colder regions of the northern hemisphere accompanies in the south H. redolens, but is a smaller grass. These grasses are particularly valuable for their fragrance as constituents of hay, the odorous principle, as in Anthoxanthum, Melilotus, and Asperula, being cumarin. Hierochloas are particularly appropriate for cold, wet, moory grounds.

Hippocrepis comosa, Linné.

The Horse-shoe Vetch. Middle and South Europe, North Africa. A perennial fodder herb, not without importance. Likes stony ground, and delights, like most leguminous herbs, in limestone soil. The foliage is succulent and nutritious. Langethal recommends it for a change after Saintfoin pastures fail. It furnishes not quite as much, but an earlier, fodder.

Holcus lanatus, Linné.

Europe, North Africa, Middle Asia. A well-known and easily disseminated perennial pasture grass, of considerable fattening property. For rich soil better grasses can be chosen, but for moist, moory, or sandy lands, and also for forests, it is one of

the most eligible grasses, yielding an abundant crop; it is however, rather disliked by cattle as well as horses.

Holcus mollis, Linné.

Of nearly the same geographic range and utility as the preceding species. Particularly admissible for sandy forest land.

Holoptelea integrifolia, Planchon. (*Ulmus integrifolia,* Roxburgh).

The Elm of India, extending from the lowlands to Sub-Alpine regions. A large tree, with timber of good quality. Foliage deciduous.

Hordeum deficiens, Steudel.

The Red Sea Barley. One of the two-rowed Barleys, cultivated in Arabia and Abyssinia. Allied to this is H. macrolepis (A. Br.), a native of Abyssinia.

Hordeum distichon, Linné.*

Central Asia. The ordinary two-rowed Barley. To this species belong: the ordinary English Barley, the Chevalier, the Annat, the Dunlop, the Long-eared, the Black, the Large, the Italian, and the Golden Barley, along with other kinds. A variety with grains free from the bracts constitutes the Siberian and the Haliday Barley, which, however, is less adapted for malt. Dry barley flour, heated at the temperature of boiling water during several hours, constitutes Hufeland's meal for invalids. Barley culture might be carried on in many Alpine regions. Marly and calcareous lands are particularly fit for its culture. It resists moderate spring frosts.

Hordeum hexastichon, Linné.*

Orient. The regularly six-rowed Barley. This includes among other varieties the Red, the Scotch, the Square, and the Bear Barley. Seeds less uniform in size than those of H. distichon. The so-called skinless variety is that in which the grain separates from the bracts. Langethal observes that it is most easily raised, requires less seed grain than ordinary barley, has firmer stems, is less subject to the rust disease and to bending down.

Hordeum secalinum, Schreber.* (*H. nodosum,* Linné; *H. pratense,* Hudson.)

Europe, North and Middle Asia, North America. Perennial.

Famed as the best fattening grass of many of the somewhat brackish marsh pastures on the North Sea. It never fruits when kept down by cattle, and suppresses finally nearly all other grasses and weeds.

Hordeum vulgare, Linné.*

Orient. The four-rowed Barley, though rather six-rowed with two prominent rows. Several varieties occur, among them: the Spring, Winter, and Black Barley, the Russian, the French, the Naked, and the Wheat Barley. Pearl Barley is obtained from the winter variety, which also surpasses Summer Barley in rigour of stems and rich and early yield, it being the earliest cereal in the season; the straw is copious and nutritious, and the grain is rich in gluten, hence far better adapted for flour than for malt. Summer Barley also passes under the name of Sand Barley; it is inferior in yield to H. distichon, but is content with a less fertile, even sandy soil, and comes in a month's less time to ripeness. In Alpine regions it ripens with a summer of sixty or seventy days without frost. The Naked Barley is superior to many other varieties for peeled barley, but inferior for brewing; the grain is also apt to drop (Langethal). Malt is important as an antiscorbutic remedy. Chemical principles of malt: asparagin; a protein substance; diastase; an acid and cholesterin fat.

Hordeum zeocriton, Linné.*

Central Asia. Also a two-rowed Barley. To this species belong the Sprat, the Battledore, the Fulham, and the Putney Barley, the Rice Barley, the Turkish Barley, and the Dinkel. This species might be regarded as a variety of H. distichon. The grains do not drop spontaneously, and this variety is securer than others against sparrows; requires, however, a superior soil, and is harder in straw (Langethal).

Hovènia dulcis, Thunberg.

Himalaya, China, Japan. The pulpy fruit-stalks of this tree are edible. H. inæqualis, DC., and H. acerba, Lindl., are mere varieties of this species.

Humulus Lupulus, Linné.*

The Hop Plant. Temperate zone of Europe, Asia, and North America. This twining perennial unisexual plant has proved to yield enormously on river banks in rich soil or on fertile slopes where irrigation could be effected, particularly so in

Victoria along the river valleys of Gippsland and in other similar localities. A pervious, especially alluvial soil, fertile through manure or otherwise, appliances for irrigation, natural or artificial, and also shelter against storms, are some of the conditions for success in hop growth, and under such conditions the rearing of hops will prove thus far profitable in countries and localities of very different mean temperature. A dry summer season is favourable to the ripening and gathering of hops. On the Mitchell River, in Gippsland, 1,500 lbs. have been obtained from an acre. In Tasmania large crops have been realised for very many years. The plant might be readily naturalised on river banks and in forest valleys. The scaly fruit-cones form the commercial hops, whose value largely depends on the minute glandular granules of lupuline. Hops impart their flavour to beer, and principally by their tannic acid prevent acetous fermentation and precipitate albuminous substances from the malt. Hop pillows are recommended to overcome want of sleep. Many of the substitutes of hops are objectionable or deleterious. The refuse of hops of breweries possess double the value of stable manure. Active principles of hop leaves and fruits: a peculiar volatile and a bitter acid substance. The fibre of the stem can be made into cords and paper. The young shoots can be used for food, dressed like asparagus.

Hydnum coralloides, Scopoli.

Cashmere, in hollow trunks of Pinus Webbiana, called there the Koho Khur. Cooked, of excellent taste.

Hydnum imbricatum, Linné.

In pine forests of Europe. A wholesome Mushroom of delicious taste, which we should endeavour to naturalise in our pine plantations. Other recommendable European species are: H. erinaceum, Pers.; H. coralloides, Scop.; H. album, Pers.; H. diversidens, Fries; H. auriscalpium, Linné; H. subsquamosum, Batsch; H. lævigatum, Sw.; H. violascens, Alb.; H. infundibulum, Sw.; H. fuligineo-album, Schm.; H. graveolens, Brot.; H. Caput Medusæ, Nees; H. Hystrix, Fries. These and other edible fungi are given on the authority of Rosenthal's valuable work. The Rev. M. L. Berkley and Dr. Goeppert add: Hydnum repandum, L., and H. suaveolens, Scop.

Hydrangea Thunbergi, Siebold.

Japan. The leaves of this shrub give a peculiar Tea, called there the "Tea of Heaven."

Hydrastis Canadensis, Linné.

North America. The Yellow Poccoon. A perennial herb, utilised in medicine. The root contains two alkaloids, berberin and hydrastin. The root tinges brilliantly yellow, admitting of its use along with indigo for rich green colours.

Hymenæa Courbaril, Linné.

Tropical and Southern sub-tropical America. A tree of colossal size and remarkable longevity. Timber hard, extremely ponderous, close-grained, used for select wheel-work, trenails, beams, and planks in various machinery. A fragrant amber-like resin, known as West India Copal, exudes from the stem. The Mexican trade name of the resin is Coapinole. The beans of the pod are lodged in a mealy pulp of honey-like taste, which can be used for food. The possibility of the adaptability of this remarkable tree to the warmer temperate zone needs to be ascertained.

Hymenanthera Banksii, F. v. Mueller.

South-East Australia, New Zealand, Norfolk Island. A tall spiny shrub, well adapted for close hedges, where rapid growth is not required. It stands clipping well. Flowers profusely fragrant.

Hyoscyamus niger, Linné.

The Henbane. Europe, North Africa, extra-tropical Asia. An important medicinal herb of one or two years' duration. It contains a peculiar alkaloid—hyoscyamin.

Hyospathe pubigera, Grisebach.

Trinidad, on the summits of the highest mountains. The stem of this Palm attains only to 12 feet. Valuable among the dwarf palms, now so much sought for table and window decoration.

Hyphæne Argun, Martius.

Nubia to 21° north latitude. Probably hardy in the warmer temperate zone.

Hyphæne coriacea, Gaertner.

Equatorial Eastern Africa. The dichotomous Palm of the sea-coast regions. It attains a height of 80 feet.

Hyphæne crinita, Gaertner. (*H. Thebaica,* Martius.)

Abyssinia, Nubia, Arabia, and Egypt, as far as 31° north

latitude, and southward to the Zambesi, Nyassa, and Sofala. In Arabia to 28° north latitude (Schweinfurth), up to the plateaux of Abyssinia (Drude). The Gingerbread Palm or Doum Palm. It is much branched and attains a height of about 30 feet. The mealy husk of the fruit is edible. Grows away from the sea.

Hyphæne ventricosa, Kirk.

Zambesi. Loftier than the other species. Stem turgid towards the middle. Fruit large.

Hypochœris apargioides, Hooker and Arnott.

Chili. A perennial herb. The root is used for culinary purposes like that of the Scorzonera Hispanica.

Hypochœris Scorzoneræ, F. v. Mueller. (*Achyrophorus Scorzoneræ,* Candolle.)

Chili. Of the same use as H. apargioides. Allied species of probably similar utility exist in Western South America.

Ilex Cassine, Linné.

Southern States of North America. A Tea bush, to which also remarkable medicinal properties are ascribed.

Ilex Paraguensis, St. Hilaire.

Uruguay, Paraguay, and Southern Brazil. The Maté. This Holly bush, which attains the size of a small tree, is inserted in this list rather as a stimulating medicinal plant than as a substitute for the ordinary Tea plant, although in its native country it is very extensively used for this purpose. From the province of Parana alone there were exported more than 36 million pounds in 1871, besides 9 million pounds used for home consumption; while in Rio Grande de Sul the local provincial consumption is nearly four times as much, not counting large quantities consumed by the aboriginal race. It is cheaper than coffee or tea (about 5*d.* per pound), and an individual there uses about 1 lb. per week. It has a pleasant aroma, and can be taken with milk and sugar. It is the favourite beverage in large portions of South America (Dr. Macedo Soares). The leaves destined for the Maté are slightly roasted. I. Dahoon and I. dipyrena are used for the same purpose, and probably other hollies may be found equally good. Chemical principles: coffein, quina acid, and a peculiar tannic acid, which latter can be converted into viridin acid.

Illicium anisatum, Linné.

China and Japan. The Star Anis. An evergreen shrub or small tree. The starry fruits used in medicine and as a condiment. Their flavour is derived from a peculiar volatile oil with anethol. This species and a few others deserve culture also as ornamental bushes.

Imperata arundinacea, Cyrillo.

South Europe, North Africa, South and East Asia, Australia. The Lalong Grass of India. Almost a sugarcane in miniature. Valuable for binding sand, especially in wet localities. Difficult to eradicate.

Indigofera Anil, Linné.

Recorded as indigenous to West India, and as extending naturally through continental America from Carolina to Brazil. A shrub several feet high. Pods sickle-shaped, short, compressed. One of the principal Indigo plants under cultivation both in the eastern and western hemispheres. Only in the warmer parts of the temperate zone can we hope to produce indigo with remunerative success. But many of the hardier species seem never yet to have been tested for pigment. One hundred and fourteen have already been recorded from extra-tropical Southern Africa alone. An Indigofera of Georgia, said to be wild, perhaps I. Anil, yields an excellent product. The pigment in all instances is obtained by maceration of the foliage, aeration of the liquid, and inspissation of the sediment.

Indigofera argentea, Linné. (*I. cærulea,* Roxburgh.)

Tropical and extra-tropical Northern Africa, Arabia, India. A shrub several feet high, closely allied to I. Anil, and likewise a good Indigo plant.

Indigofera tinctoria, Linné.

Warmest parts of Asia, as far east as Japan; recorded also from tropical Africa and even Natal. A shrubby plant, attaining a height of 6 feet. Pods straight, cylindrical, many-seeded. Extensively cultivated in warm zones for indigo, and probably hardy in warmer temperate regions. The plant is frequently sold fresh by the grower to the factories. The Indigo plant requires a rich friable soil, neither too moist nor too dry. The seeds are sown in furrows about a foot apart, and in hot damp climes the plant can be cut in about two months, as soon as it begins to flower; in six or eight

weeks it yields a second crop, and under favourable circumstances as many as four crops can be gathered in a year. The plants have to be renewed every year, as the old ones do not yield such an abundant produce. Bright sunshine favours the development of the dye principle, but frequent rains cause a more luxuriant growth (Hartwig).

Inula Helenium, Linné.

The Elecampane. Middle and South Europe, Middle Asia eastward to Japan. A perennial herb. The bitter and somewhat aromatic root, for the sake of its stimulating and tonic properties, is used in medicine. It contains also the amylaceous inulin and the crystalline helenin. With the Mullein (Verbasum Thapsus), L., adaptable for scenic effects.

Ipomœa Batatas, Poiret.* (*Batatas edulis,* Choisy.)

The Sweet Potato. Tropical South America. First brought to Europe from Brazil. It proved well adapted also for the southern part of Australia and for New Zealand. The tubers afford a palatable food, more nutritious than ordinary potatoes. Varieties with red, white, and yellow roots occur. Each tuber weighs generally from 3 lbs. to 5 lbs., but may occasionally attain to 56 lbs. The yield is from 200 to 300 bushels from an acre.

Ipomœa Batatilla, G. Don.

Cooler regions of Venezuela. The tubers serve as sweet potatoes. Similarly useful I. platanifolia, Roem. et Schult., from Central America, and I. mammosa, Choisy, from Amboina.

Ipomœa Calobra, Hill and Mueller.

Central Australia. The large roots a fair esculent.

Ipomœa megapotamica, Choisy.

South Brazil and Argentina. The root attains several pounds weight, and serves as jalap. Propagation by pieces of the root or from cuttings of the underground stem.

Ipomœa paniculata, R. Brown.

Almost a cosmopolitan plant on tropical coasts; thus indigenous to North Australia and the warmer parts of East Australia. The tubers of this species also are edible. If hardy, the plant would deserve cultivation.

Ipomœa purga, Wenderoth.

Mountains of Mexico. The true Jalap. This species yields the medicinal jalap root. It has recently been cultivated with apparent success even at New York; thus it is entitled to a trial in warm woodlands. Active principle: the resinous convolvulin. I. Orizabensis, Ledanois, also yields jalap, according to Hanbury.

Ipomœa simulans, Hanbury.

Mexico. From this species the Tampico jalap, or rather the Sierra Gorda jalap, is derived. I. operculata, Mart., yields the Brazilian jalap.

Iris Florentina, Linné.

Countries around the Mediterranean Sea. The well-known Orris root is obtained from this species. Of the same geographic range is Iris juncea, Poizet, the edible root of which is known by the name of Zeloak among the Algerian natives (Simmons).

Isatis indigotica, Fortune.

North China. Perennial, almost shrubby. The use is similar to that of the following plant.

Isatis tinctoria, Linné.

Dyer's Woad. From the Mediterranean regions through part of the Orient, apparently extending as far as Japan. A tall herb of two years' duration. The blue dye is obtained from the fermented leaves. Woad succeeds best in rich limestone ground. Contains luteolin. Many other species of Isatis, mostly Asiatic, may perhaps produce dye with equal advantage. Bossier enumerates merely as Oriental twenty-eight kinds.

Isonandra Gutta, Hooker.* (*Didropsis Gutta,* Benth.)

The Gutta-percha Tree or the Gutta Taban. Malayan Peninsula. It seems not altogether hopeless to render this highly important tree a denizen of the mildest wood regions, in temperate climes, Murton having traced it to elevations of 3,500 feet. The milky sap, obtained by ringing the bark at 5 to 15 inches interstices, is boiled for an hour before gradual exsiccation, otherwise the percha becomes brittle; 5 to 20 catties yielded by one tree.

Jacaranda mimosifolia, Don.

Brazil. This tree, with *J. Braziliana* and *J. obtusifolia*

(Humboldt), furnishes a beautiful and fragrant kind of Palixander or Palissandre wood, and so do probably some other tropical American species. This wood is bluish red, traversed by blackish veins. *J. mimosifolia* is hardy at Sydney, and thus may perhaps be reared with advantage also in the warmer and moister regions of the temperate zone.

Jacksonia cupulifera, Meissner.

West Australia. It might prove an advantage to disseminate this small tree in arid desert regions, as horses and cattle relish the foliage amazingly. Several other Jacksonias share the importance which this congener of theirs has acquired from its utility as a pasture-bush.

Jasminum grandiflorum, Linné.

From India to Japan. Flowers white. Extensively cultivated in South Europe. It is planted in rows 3 feet apart, the plants at a distance of 2 to 3 inches in the rows. Leek, tuberoses, and similar plants are used to occupy the spare ground for the first year; 1,000 plants in the second year after grafting produce 50 kilos (about 1 cwt.) of flowers in rich soil. Five thousand kilos can be produced on an hectare (nearly 2½ acres), which under very favourable circumstances will realise a profit of 5,800 francs per annum. Against frost and exposure to wind the plants must be guarded (Dehérain). In France it is generally grafted on J. officinale. The bushes are richly manured and well watered. Ordinary cleft-grafting is practised, the stock being headed down to near the ground. A good workman and assistant will graft about 1,000 plants in a day. The delicate scent is withdrawn either by fixed oils or alcoholic distillation. The pecuniary yield obtainable from Jasmin cultivation seems vastly overrated, even if inexpensive labour should be obtainable.

Jasminum odoratissimum, Linné.

Madeira. Shrubby like the rest. Flowers yellow. Used like the foregoing and following for scent. This may be prepared by spreading the flowers upon wool or cotton slightly saturated with olive oil or other fixed oil, and covering them with other layers so prepared. The flowers are renewed from time to time until the oil is thoroughly pervaded by the scent, when the latter is withdrawn by alcohol. Other modes of extracting the oil exist.

Jasminum officinale, Linné.

From the Caucasus to China. Flowers white. This is the

principal species cultivated in South Europe for its scent. In Cannes and Nice about 180,000 lbs. of jasmin flowers are produced annually for distillation (Regel). By Simmonnet's process the essence of jasmin is solidified as jasminion.

Jasminum Sambac, Aiton.

From India to Japan. It has the richest perfume of all. The bush attains a height of 20 feet, and is almost climbing. The flowers are white, and must be collected in the evening before expansion. The relative value of many other species of jasmin, nearly all from the warmest parts of Asia, seems in no instance to have been ascertained, so far as their oils or scents are concerned. The Australian species are also deliciously fragrant, amongst which J. lineare, Br., occurs in Victorian deserts; while also J. didymum, Forst.; J. racemosum, F. v. M.; J. simplicifolium, Forst.; J. calcareum, F.v. M.; and J. suavissimum, Lindl., reach extra-tropical latitudes.

Jubæa spectabilis, Humboldt.

The tall and stout Coquito Palm of Chili, hardy still in Valdivia. Well adapted for extra-tropical latitudes. A kind of treacle is obtained from the sap of this Palm. A good tree will give 90 gallons of meliaginous sap (C. Darwin). The small kernels are edible. Stem to 60 feet, turgid towards the middle; leaves 10 feet long.

Juglans cinerea, Linné.*

The Butternut Tree of North America. About 50 feet high; stem-diameter 4 feet. Growth of comparative celerity; admits of transplantation readily. Likes rocky places in rich forests, but is also content with poor soil. Wood lighter than that of the Black Walnut, durable and free from attacks of insects. It is particularly sought for furniture, panels of coaches, corn-shovels, wooden dishes, and similar implements, as it is not liable to split, nor heavy. The kernel of the nuts is more oily than that of the ordinary walnut, taste similar to Brazil nuts. The leaves, bark, and husk are of medicinal importance, and so are those of other species.

Juglans cordiformis, Maximowicz.

Japan. This species approaches in many respects J. Sieboldiana.

Juglans Mandschurica, Maximowicz.

Corea and Mandschuria. This Walnut is allied to J. cinerea of North America.

Juglans nigra, Linné.*

Black Walnut Tree. Attains a height of 70 feet; trunk 4 feet in diameter; found in rich forest land in North America. Wood most ornamental, purplish brown, turning dark with age, strong, tough, not liable to warp nor to split; not attacked by insects. Supplies three-fourths of the material for hardwood furniture in the United States (Sargent) and fetches there the highest price. Wood stored for many years is the best for gun-stocks. For the sake of its compactness, durability, and its susceptibility to high polish, it is much sought for elegant furniture, stair-rails, and other select purposes. Seeds more oily than the European walnut. The tree extends in a slightly altered variety to Bolivia and Argentina.

Juglans regia, Linné.*

The ordinary Walnut Tree of Europe, but of Central Asiatic origin. It attains a height of fully 80 feet, and lives many centuries. Wood light and tough, much sought for gunstocks, the choicest furniture, and other things. The shells of the nut yield a black pigment. Trees of select quality of wood have been sold for £600, the wood being the most valuable of Middle Europe. In some departments of France a rather large quantity of oil is pressed from the nuts, which, besides serving as an article of diet, is used for the preparation of fine colours. To obtain first-class fruit, the trees are grafted in France (Michaux). An almost huskless variety occurs in the north of China. Can be grown in cold localities, as it lives at 2,000 feet elevation in Middle Europe. Nuts for distant transmission, to arrive in a fit state for germination, are best packed in casks between layers of dry moss.

Juglans rupestris, Engelmann.

From California to New Mexico, along the course of streams in rich moist soil. A handsome symmetrical tree of utility, attaining a height of 60 feet, 3 feet in diameter (Dr. Gibbons).

Juglans Sieboldiana, Maximowicz.

Throughout Japan, where it forms a large tree.

Juglans stenocarpa, Maximowicz.

From the Amoor territory. Allied to J. Mandschurica.

Juniperus Bermudiana, Linné.*

The Pencil Cedar of Bermuda and Barbadoes. This species

grows sometimes 90 feet high, and furnishes a valuable red durable wood, used for boat-building, furniture, and particularly for pencils, on account of its pleasant odour and special fitness. Many of the plants called Thuya or Biotia Meldensis in gardens belong to this species.

Juniperus brevifolia, Antoine.

In the Azores up to 4,800 feet; a nice tree with sometimes silvery foliage.

Juniperus Cedrus, Webb.

A tall tree of the higher mountains of the Canary Islands.

Juniperus Chinensis, Linné.

In temperate regions of the Himalaya up to an altitude of 15,000 feet, also in China and Japan. This tree is known to rise to 75 feet, exceptionally even to 100 feet, with a girth of stem of 13 feet; it is of rapid growth, furnishing a reddish, soft, and fine-grained wood, suitable for pencils (*Hoopes*). Probably identical with it is the Himalayan Pencil Cedar (Juniperus religiosa, Royle). The timber of some other tall Junipers needs tests.

Juniperus communis, Linné.

Colder parts of Europe, Asia, North Africa, and North America, ascending the European Alps to 8,000 feet, the Indian mountains to 14,000 feet. One of the three native Coniferæ of Britain, attaining under favourable circumstance a height of nearly 50 feet. The berries are of medicinal value, also used in the preparation of gin. Important for fuel in the coldest regions. Will grow on almost pure sand.

Juniperus drupacea, Labillardière.

Plum Juniper. A very handsome, long-leaved juniper, the Habhel of Syria. It attains a height of 30 feet, and produces a sweet edible fruit, highly esteemed throughout the Orient.

Juniperus excelsa, Bieberstein.

In Asia Minor, 2,000 to 6,000 feet above the sea-level. Extends to the Himalayas, where its range of elevation is from 5,000 to 14,000 feet. A stately tree, 60 feet high. Trunk short but of great girth, over 20 feet circumference being known (Stewart and Brandis).

Juniperus flaccida, Schlechtendal.

In Mexico, 5,000 to 7,000 feet high. A tree of 30 feet in height, rich in resin, similar to sandarac.

Juniperus fœtidissima, Willdenow.

A tall and beautiful tree in Armenia and Tauria, 5,000 to 6,500 feet.

Juniperus Mexicana, Schiede.

Mexico, at an elevation of 7,000 to 11,000 feet, A straight tree, 90 feet high, stem 3 feet diameter, exuding copiously a resin similar to sandarac.

Juniperus occidentalis, Hooker.

North California and Oregon, at 5,000 feet. A straight tree, 80 feet high, with a stem of 3 feet diameter. Wood pale, comparatively hard. Thrives well among rocks.

Juniperus Phœnicea, Linné.

South Europe and Orient. A small tree, 20 feet high, yielding an aromatic resin.

Juniperus procera, Hochstetter.

In Abyssinia. A stately tree, furnishing a hard, useful timber.

Juniperus recurva, Hamilton.

On the Himalayas, 7,500 to 15,000 feet high. A tree attaining 30 feet in height, or according to J. Hoopes even 80 feet.

Juniperus sphærica, Lindley.

North China. A handsome tree, 40 feet high.

Juniperus Virginiana, Linné.

North American Pencil Cedar or Red Cedar. A handsome tree, 90 feet high, supplying a fragrant timber, much esteemed for its strength and durability; it is dense, fine-grained, light, and pleasantly odorous; the inner part is of a beautiful red colour, the outer is white; it is much used for pencils. One of the best of all woods for buckets, tubes, and casks. Simmonds observes that fence-posts of this wood last for ages. Of wonderful durability for railway cross-ties (Barney). The heartwood is almost imperishable (Vasey). It is not bored by insects. The tree grows best near the sea, but is rather independent of soil and locality.

Juniperus Wallichiana, J. Hooker and Thomson.

From the Indus to Sikkim, at elevations from 9,000 to 15,000 feet. Attains a height of 60 feet. Desirable for transfer to our Alps. Wood similar to that of J. excelsa (Stewart and Brandis).

Justicia Adhatoda, Linné.

India; enduring the climate of the lowlands of Victoria. This bush possesses anti-spasmodic and febrifugal properties. It can be utilised also as a hedge plant.

Kentia Baueri, Seemann.

The Norfolk Island Palm. Height 40 feet.

Kentia Beccarii, F. v. Mueller. (*Nengella montana,* Beccari.)

On the mountains of New Guinea up to 4,500 feet. This slender Palm is only a few feet high and eligible, like *Kentia minor* from North-East Australia, for domestic decoration.

Kentia Belmoriana, Moore and Mueller.

The Curly Palm of Lord Howe's Island. About 40 feet high. With its congeners, evidently destined to grace our gardens and to become also important for horticultural traffic abroad.

Kentia Canterburyana, Moore and Mueller.

Umbrella Palm of Lord Howe's Island. Likewise a tall and hardy Palm.

Kentia Moluccana, Beccari.

Ternate, at heights up to 3,500 feet. This noble and comparatively hardy Palm attains a height of 90 feet.

Kentia Mooreana, F. v. Mueller. (*Clinostigma Mooreana,* F. v. M.)

Dwarf Palm of Lord Howe's Island, where it occurs only on the summits of the mountains.

Kentia sapida, Blume.

The Nika Palm of New Zealand and the Chatham Islands. It also attains a height of 40 feet, is one of the hardiest of all Palms, and extends to the most southern latitude attained by any Palm, being found down to 44° south latitude. The unexpended flower-spikes can be converted as palm-cabbage into food.

Kochia villosa, Lindley.

In most of the depressed and saline regions of Australia. Renowned amongst occupiers of pasture land as the "Cotton Bush." This rather dwarf shrub resists the extremes of drought and heat of even the trying Central Australian clime.

Knightia excelsa, R. Brown.

The Rewa Rewa of New Zealand. This tree is recommended as valuable for ornamental work and furniture (Campbell Walker).

Kœleria cristata, Persoon.

Widely dispersed over the globe. A perennial grass of fair nutritive quality, sustaining itself on dry soil. The closely allied K. glauca can be sown with advantage on coast sand.

Krameria triandra, Ruiz.

Chili, Peru, and Bolivia, at elevations from 3,000 to 8,000 feet. This pretty little shrub can be grown on sandy ridges in an equable clime. It produces the medicinal Ratanhia root, well known also as a dentifrice. The root contains 38 to 43 per cent. tannin (Muspratt). Some other species have similarly astringent roots, particularly K. Ixine (Loefling), from Central America and West India. Some could be chosen to aid in adorning and diversifying our gardens.

Lactuca sativa, Linné.

South Asia. The ordinary annual Lettuce, in use since remote antiquity. It is not without value, especially as a sedative, for medicinal purposes. L. Scariola, Linné, seems to be the wild state of the garden lettuce. L. altissima, Bieberstein, is a variety attaining a height of 9 feet. All yield lactucarium.

Lactuca virosa, Linné.

Middle and South Europe, North Africa, Middle Asia. A biennial. The inspissated juice of this lettuce forms the sedative lactucarium.

Lapageria rosea, Ruiz and Pavon.

Chili. The Copigué. Almost the only plant which can exist in the area covered by the sulphurous smoke of the local smelting furnaces (Cunningham's Magellan). A half-woody climber with large showy flowers. The berries, which are of the size of a hen's egg, are sweet and edible. The plant bears slight frosts.

Lardizabala biternata, Ruiz and Pavon.

Chili. A climber with stems of enormous length. Might be naturalised in our forests for obtaining the tough fibre for cordage. In its native country the torrified stems are used instead of ropes, according to Dr. Philippi.

Laserpitium aquilegium, Murray.

Middle and South Europe. The stems of this perennial herb are edible. The fruits serve as a condiment.

Lathyrus Cicera, Linné.

Countries at or near the Mediterranean Sea, also Canary Islands. An annual, similar in its use to L. sativus, furnishing a tender, palatable fodder, on sandy soil. L. Clymenum, L., from the same regions, serves similar purposes.

Lathyrus macrorrhizus, Wimmer. (*Orobus tuberosus,* Linné.)

Europe, West Asia. This herb would establish gradually pasturage in sterile forest regions, and could with some allied species be disseminated in Alpine regions.

Lathyrus pratensis, Linné.

Europe, North and Middle Asia. The Meadow Pea. A good perennial pasture herb. It can also be utilised for forest pastures, like L. silvestris. The yield is considerable, and the herbage, though bitter, is relished by sheep. The plant spreads easily, particularly on fresh ground. L. tuberosus (L.) can likewise be utilised as a fodder herb; its tubers are edible, but very small.

Lathvrus sativus, Linné.

Middle and South Europe. The Jarosse. An annual forage herb; the pods also available for culinary purposes. Superior, according to Langethal's observations, to vetches in quality of fodder and seed, but inferior in yield, content with a lighter soil, hence often chosen for first sowing on sand lands. Lime in the soil increases the return. Can only be used with great caution, as its frequent or continuous use induces, like L. Cicera, paralysis, not only to man, but also to horses, cattle, and birds. Probably other species of Lathyrus could advantageously be introduced.

Laurelia aromatica, Poiret.

Southern Chili. A colossal tree, in Valdivia the principal one used for flooring. Wood never bored by insects, and

well able to stand exposure to the open air, far superior to that of L. serrata, the Vouvan or Huahuoa, which tree predominates over L. aromatica, in the far south of Chili (Dr. Philippi).

Laurus nobilis, Linné.*

Asia Minor. The Warrior's Laurel of the ancients. The leaves are in much request for various condiments, and the peculiar aroma of these Bay leaves cannot be replaced by any others, except those of Lindera Benzoin.

Lavandula angustifolia, Ehrhart. (*L. vera*, Candolle.)

Countries around and near the Mediterranean Sea. The Lavender Plant, of somewhat shrubby growth, from which by distillation the best oil of lavender is prepared. It lives on dry soil, but is less hardy than the following.

Lavandula latifolia, Villars. (*L. spica*, Candolle.)

South Europe, North Africa. From this species also much lavender oil is obtained.

Lavandula Stœchas, Linné.

South Europe, North Africa. Topped Lavender. This shrub can also be utilised for oil distillation and other purposes, for which the two other Lavenders are used. The quality of the oil of these species seems to differ according to their locality of growth. Mr. James Dickinson, of Port Arlington, Victoria, informs us that this is the best plant known to him for staying sand. It grows much quicker than the Ulex; every seed which falls germinates, so that around each bush every stroke of the spade brings up lots of seedlings fit for transplantation. In Southern Australia five months in full flower annually, it being early in bloom. Bees are passionately fond of the mellaginous secretion of the flowers. Mr. Dickinson calculates that annually from an acre of this Lavender a ton of the finest-flavoured honey can be obtained.

Lavatera arborea, Linné.

Tree Mallow of Middle Europe and the countries on the Mediterranean Sea. A tall biennial plant of rapid growth. The ribbon-like bast is produced in greater abundance than in most other malvaceous plants, and is recommended for paper material. The Tree Mallow might easily be naturalised on sea-shores, where it would be useful as a quick shelter. Per-

haps it might serve with allied plants for green manure. The bulky foliage has proved valuable for fodder, and so has that of Lavatera plebeja (Sims).

Lawsonia alba, Lamarck.

North and Middle Africa, Persia, Arabia, India, and North-Western Australia. The Henne or Henna Bush. It may become of use as a dye-plant in the regions free of frost. The orange pigment is obtained from the ground foliage. The plant can also be used for garden hedges.

Leersia hexandra, Swartz.

Africa, South Asia, warmer parts of America and Australia. Found by Mr. Bailey to be one of the most relished by cattle among aquatic grasses of East Australia. L. Gouini (Fournier) is a Mexican species.

Leersia oryzoides, Swartz.

Middle and South Europe, various parts of Asia, Africa, and America. A perennial, nutritious swamp grass. Other Leersias from both hemispheres are deserving of introduction.

Lepidium latifolium, Linné.

Europe, North Africa, Middle and North Asia. A perennial herb of peppery acridity, much used for some select sauces.

Lepidium sativum, Linné.

The Cress. Orient. Annual. Irrespective of its culinary value, cress is of use as one of the remedies in cases of scurvy. Active principle: a volatile oil and the bitter lepidin.

Lepidosperma gladiatum, Labillardière.

The Sword Sedge of the sea-coasts of extra-tropical Australia. One of the most important plants for binding sea-sand, also yielding a paper material as good as Sparta.

Leptospermum lævigatum, F. v. Mueller. (*Fabricia lævigata,* Gaertner.)

The "Sandstay." Sea-shores and sand deserts of extra-tropical Australia, but not extending to Western Australia. This shrub or small tree is the most effectual of all for arresting the progress of drift sand in a warm clime. It is most easily raised by simply scattering in autumn the seeds on the sand and covering them loosely with boughs, or better still by

spreading lopped-off branches of the shrub itself, bearing ripe seeds, on the sand.

Lespedeza striata, Hooker and Arnott.*

China and Japan. Sometimes called Japan Clover. An annual herb, which in North America has proved of great use. Professor Meehan states it to be identical with the Hoop Koop plant, and that it has taken possession of much waste land in the Southern States. It grows there wonderfully on the hot dry soil, and the cattle like it amazingly. Mr. Jackson observes that it readily takes possession of waste lands and even spaces between forest trees, covering the soil with a dense permanent herbage.

Leucadendron argenteum, Brown.

The Silver Tree of South Africa is included on this occasion among forest trees, because it would add to the splendour of our woods, and thrive far better there than in our gardens. Moreover, with this tree many others, equally glorious, might be established in our mild forest glens as a source of horticultural wealth, were it only to obtain in future years a copious supply of seeds. Mention may be made of the tall Magnolia trees of North America (Magnolia grandiflora, L., 100 feet high; M. umbrella, Lam., 40 feet; M. acuminata, 80 feet; M. cordata, Michx., 50 feet; M. Fraseri, Walt., 40 feet; M. macrophylla, Michx., 40 feet); M. Yulan, Desf., of China, 50 feet; Magnolia Campbelli, Hook., of the Himalayas, 150 feet high and flowers nearly a foot across; M. sphærocarpa, Roxb., also of the Indian highlands, 40 feet; the Mediterranean Styrax Tree (Styrax officinalis, L.); Stenocarpus sinuosus, Endl., of East Australia (the most brilliant of the Proteaceæ); the crimson and scarlet Ratas of New Zealand (Metrosideros florida, Sim.; M. lucida, Menz.; M. robusta, Cunn., 80 feet high; M. tomentosa, Cunn., 40 feet); Fuchsia excorticata, L., also from New Zealand, stem 2 feet in diameter; the crimson-flowered Eucalyptus ficifolia of West Australia; Rhododendron Falconeri, Hooker, from Upper India, 50 feet high, leaves 18 inches long. In the warm and humid gullies here alluded to also may be planted the great Melaleuca Leucadendron, L., the true Asiatic Cajaput Tree, which grows to a height of 100 feet; even the North European Holly (Ilex aquifolium), which occasionally rises to 60 feet, though both from regions so distant.

Levisia rediviva, Pursh.

North-West America. The root of this herb is large and

starchy, formerly extensively used by the native inhabitants, and called by them the "Gift of the Great Spirit." The plant deserves trial culture.

Leyssera gnaphalioides, Linné.

South Africa. A perennial herb of aromatic scent and taste. Much used there as a medicinal tea.

Liatris odoratissima Willdenow.

Southern States of North America. A perennial herb occurring on swampy places. The leaves are sometimes used, for the sake of their aromatic odour, to flavour tobacco and other substances (Saunders).

Libocedrus Chilensis, Endlicher.

In cold valleys on the Southern Andes of Chili, 2,000 to 5,000 feet. A fine tree, 80 feet high, furnishing a hard resinous wood of a yellowish colour.

Libocedrus decurrens, Torrey.

White Cedar of California, growing on high mountains, in fine groves up to 5,000 feet, in what Hinchcliff calls the noblest zone of Coniferæ of the globe. Attains a height of fully 200 feet, with a stem 25 feet in circumference. The wood is light and strong, used for exquisite cabinet-work, but also suitable for fence rails, &c. According to Dr. Gibbons the tree is well adapted for wind-brakes and can be trained into tall hedges.

Libocedrus Doniana, Endlicher.

North Island of New Zealand, up to 6,000 feet elevation. A forest tree 100 feet high, stem 3 feet and more in diameter. The wood is hard and resinous, of a dark reddish colour, fine-grained, excellent for planks and spars.

Libocedrus tetragona, Endlicher.*

On the Andes of North Chili, at an elevation of 2,000 to 5,000 feet, growing as far south as Magelhaen's Straits, especially in moist moory localities. This species has a very straight stem and grows 120 feet high. The wood, though soft and light, is resinous, and will resist underground decay for a century and more, like that of Fitzroya Patagonica; for railway sleepers this timber is locally preferred to any other (Dr. Philippi); it is also highly esteemed for various artizans' work; it is quite white.

Ligustrum Japonicum, Thunberg.

The Japan Privet. A shrub, evergreen or nearly so, promising to become a valuable hedge plant. It grows like the ordinary European Privet readily from cuttings. Both will grow under trees where scarcely anything else would live (Johnson).

Limonia acidissima, Linné.

India, up to 4,000 feet; hardy in England. This shrub or small tree has fruit of extreme acidity.

Lindera Benzoin, Blume.

From Canada to the Gulf of Mexico, there called the Spice Laurel. An aromatic bush, one of the hardiest of the Order. The aroma of the foliage much like that of Bay leaves.

Linum usitatissimum, Linné.*

The Flax Plant. Orient. A well-known annual, which yields the fibre for linen and the linseed oil. Few plants find a wider congeniality of soil and climate, and few give a quicker return. Good and deep soil, particularly of forests, well-drained, is requisite for successful flax culture. The Flax belongs to the Potash plants. Change of seed grain is desirable. Thick sowing extends the length and flexibility of the fibre. To obtain the best fibre, the plant must be pulled when the seeds commence to ripen. If the seeds are allowed in part to mature, then both fibre and seeds may be turned to account. If the seed is left to ripen completely, then the fibre is generally discarded. The seed yields by pressure about 22 per cent. of oil. The residue can either be prepared as linseed meal or be utilised as admixture to stable fodder. The demand for both fibre and oil is enormous. Two principal varieties are under culture: a tall sort, with smaller flowers, closed capsules, and dark seeds; a dwarf sort, more branched (even if closely sown), with larger flowers and capsules, the seed-vessels opening spontaneously and with elasticity, while the seeds are of a pale colour. None of the perennial species of Linum are so manageable in culture as the ordinary annual flax.

Lippia citriodora, Kunth.

Peru, Chili, La Plata States, Brazil. An evergreen shrub, yielding scented oil, used for condiments, the leaves fit for flavouring tea.

Liquidambar Altingia, Blume.

At the Red Sea and in the mountains of India and New

Guinea, at 3,000 feet. The tree attains a height of 200 feet. It yields the fragrant balsam known as Liquid Storax.

Liquidambar Formosana, Hance.

China. A silk-producing insect is reared on this tree (Hance).

Liquidambar orientalis, Miller.* (*L. imberbe*, Aiton.)

Asia Minor. This tree also yields Liquid Storax, which is vanilla-scented, containing much styrol and styracin, and thus used for imparting scent to some sorts of tobacco and cigars, also for keeping moths from woollen clothing. Its use in medicine is more limited than in perfumery.

Liquidambar styraciflua, Linné.

The Sweet Gum Tree. In morasses and on the springs of the forests of North America, with a wide geographic range. Endures severe frost. The crown of the tree attains vast dimensions; the stem 10 feet in diameter. The terebinthine juice hardens, on exposure, to a resin of benzoin odour. Wood fine-grained. The bark contains about 8 per cent. tannin.

Liriodendron tulipifera, Linné.

The Tulip Tree of North America. One of the largest trees of the United States, and one of the grandest vegetable productions of the temperate zone. In deep fertile soil it attains a height of sometimes 140 feet, with a straight clear stem up to 9 feet in diameter. The Tulip wood, also inappropriately called Poplar, is highly esteemed and very extensively used wherever this tree abounds, uniting lightness with strength and durability. It is of a light-yellow colour, fine-grained, compact, is easily worked, and takes a good polish. It is employed for house-building, inside as well as outside, for bridges, furniture, coach-building, implements, and a variety of other purposes. From its uniformity and freedom from knots and disinclination to warp or shrink, it is much used in Canada for railway cars and carriage-building, chiefly for the panelling (Robb). The bark yields 8 per cent. tannin. As this tree is difficult to transplant, it should be grown on the spot where it is to remain. Though of slow growth, it would be a great acquisition for the rich lands of our mountain forests.

Lithospermum canescens, Lehmann.

North American Alkannet. This, as the vernacular name indicates, offers a dye root.

Lithospermum hirtum, Lehmann.

North American Alkanna. A showy perennial herb; the root yields a red dye.

Lithospermum longiflorum, Sprengel.

North America. A red pigment can also be extracted from the root of this species.

Livistona Australis, Martius.

East Australia. The only Palm Tree in Victoria, occurring in East Gippsland (in the latitude of Melbourne), and there attaining a height of 80 feet. The young leaves can be plaited as a material for cabbage-tree hats. Some of the Indian Livistonas may be equally hardy; their stems often tower above the other forest trees.

Livistona Chinensis, R. Brown.

South China and Japan. A very decorative Fan Palm, hardy in the lowlands of Victoria.

Livistona Mariæ, F. v. Mueller.

Central and West Australia, barely within the tropics. This noble Fan Palm attains 40 feet in height and is likely to prove very hardy.

Lolium perenne, Linné.*

Europe, North Africa, Western Asia. The perennial Rye Grass, mentioned here for the sake of completenees. L. Italicum (Al. Br.), the Italian Rye Grass, seems to be only a variety. One of the most important of all pasture grasses, also almost universally chosen for lawn culture. It produces an abundance of seeds, which are readily collected and easily vegetate. It comes early to perfection. Nevertheless the produce and nutritive powers are considerably less than those of Dactylis glomerata, Alopecurus pratensis, and Festuca elatior; but it pushes forward earlier than the last-mentioned grass, while the ripening of seeds is less defective than in Alopecurus. At the London Sewerage Depôt 60 tons of Rye Grass were obtained from one acre (McIvor). Rye Grass, though naturally living but a few years, maintains its ground well by the ease with which it disseminates itself spontaneously. Several sorts, which can scarcely be called varieties, are under cultivation. Rye Grass stands the dry heat of Australian summers well. It is likely to spread gradually over the whole of the Australian continent, and may play an important part in pasture

there, and also in ameliorating the clime of the desert districts. Sheep should not be continually kept on Rye Grass pasture, as they may become subject to fits similar to those produced by L. temulentum. It is one of the best grasses to endure traffic on roads or paths, particularly on soil not altogether light. It is one of the few among important grasses which can be sown at any season. The Italian Rye Grass is preferentially chosen as an early temporary shelter for tenderer but more lasting grasses on pastures, thus also furnishing a good collateral return in the first season.

Lotus corniculatus, Linné.

Bird's-foot Trefoil. Europe, North Africa, North and Middle Asia, extra-tropical Australia. A deep-rooting perennial herb, readily growing on pasture land, sandy links, and heathy places. This plant is well deserving cultivation on light inferior soil, on which it will yield a greater bulk of herbage than any of the other cultivated clovers ; it is highly nutritious and is eaten with avidity by cattle and sheep. From the great depth to which its roots penetrate, it is not liable to be injured by drought. It well fills out vacant places between higher fodder herbs on meadows ; it is always somewhat saline and welcome among hay. L. tenuis, Kitaibel, is a valuable variety of the coasts. The nearly allied L. major yields a still greater amount of herbage ; it is particularly suited for bushy and moist localities, and it attains its greatest luxuriance on soils which have some peat in their composition (Lawson). In Australia this Lotus shows a decided predilection for wet meadows.

Lotus Tetragonolobus, Linné.

Countries on the Mediterranean Sea. Though annual, this herb is highly valued for sheep pastures. The green pods serve as a substitute for asparagus. The allied L. siliquosus, Linné, is perennial, and occurs in a succulent form on sea-coasts.

Lupinus albus, Linné.

The White Lupine. Countries on the Mediterranean Sea, also in the Orient. An annual quick-growing herb, valuable for fodder and for green manure. It is famed as the "Tramoso" in Portugal, to suppress sorrel and other obstinate weeds by its close and easy growth. The lentil-like seeds, after the bitter principle (lupinin) has become removed through boiling or soaking in salt water, become edible. It would lead too far

to enumerate here many others of the numerous species of Lupines, of which unquestionably very many are eligible for agrarian purposes, while all are acceptable as hardy, elegant, and easily-grown garden plants. One (L. perennis, L.) extends in America to the Northern States of the Union and Canada ; fourteen are recorded from South Europe, seventeen from Brazil, and numerous species from other parts of America, where the limits of the genus are about Monte Video southward and about Nootka Sound northward. The majority of the species are perennial. The Egyptian L. Termis, Forsk., is closely allied to L. albus, and of equal use.

Lupinus angustifolius, Linné.

Countries on the Mediterranean Sea. An annual blue-flowered species preferable to *L. luteus* for grain harvest.

Lupinus arboreus, Sims.*

California. This has been used there for the reclamation of sand, on account of its long tap roots, the latter having been traced to a depth of 25 feet, while the stems were only 3 feet high. The germination is easy and the growth rapid on the sand downs. For aiding the young lupines for the first two months, to get hold of the sand, barley is sown with them, as the latter sprouts in a few days and holds the sand in the second week ; the lupine subsequently covers the sand with a dense vegetation in less than a year.

Lupinus Douglasii, Agardh.

Oregon and California. This somewhat woody species can, along with L. arboreus and L. Chamissonis, Escholtz (L. albifrons, Bentham), like many perennial Lupines from other countries, be used for binding the sand.

Lupinus luteus, Linné.*

The Scented Yellow Lupine. Countries in the vicinity of the Mediterranean Sea. This likewise annual species is predominantly in use through Middle Europe to improve sandy soil ; it is the best of all yet tested, and will do even on coast drifts. It can also be employed like some other Lupines as a fodder herb, green as well as for hay ; also as pasture herbs some Lupines are very valuable. Lupine seeds are very fattening when used as an addition to ordinary fodder, and are in this respect quite equal in value to oil-cake, while the foliage is said to be not inferior to that of clover and more bulky. Nevertheless some Lupines have proved poisonous to sheep. About

90lbs. of seeds are required for an acre. Langethal observes: "What the Saintfoin does for the poorest limestone or marly soil, that the Yellow Lupine carries out for sand land." Lupines are not adapted for wet or moory ground nor for limestone formations, where most leguminous fodder plants do well. Mr. Joseph Augustin speaks of a yellow-flowering Lupine which attains in the Azores sometimes a height of 12 feet in three months.

Lupinus varius, Linné.

The Blue Lupine. Also a Mediterranean annual, used like the above congeners; but a few others are under cultivation as Blue Lupines. Some of the American, particularly Californian species, are regarded for agrarian purposes superior to the Mediterranean kinds.

Lycium Afrum, Linné.

Africa and South-West Asia. Can with many other species be utilised as a hedge bush.

Lycopodium dendroideum, Michaux.

North America. This, with L. lucidulum, Michaux, has become there a great article of trade, being in request for bouquets and wreaths; and both plants, after having been dyed of various colours, are used as ornaments in vases, etc. (Meehan). These club mosses are mentioned here to draw attention to similar species in other countries.

Lygeum Spartum, Linné.

Regions on the Mediterranean Sea. This perennial grass serves much like the ordinary Esparto Grass, but is inferior to it.

Lyperia crocea, Ecklon.

South Africa. The flowers of this shrub produce a fine orange dye, and are also in use for medical purposes.

Maba geminata, R. Brown.

One of the Ebony Trees in Queensland. Wood, according to Mr. Thozet, black towards the centre, bright red towards the bark, close-grained, hard, heavy, elastic, and tough. It takes a high polish, and is recommended for veneers. Maba fasciculosa, F. v. M., has the outer wood white and pink. Several other species exist in Queensland, which may likely give good substitutes for Ebony wood.

Macadamia ternifolia, F. v. Mueller. (*Helicia ternifolia,* F. M.)

The Nut Tree of sub-tropical East Australia, attaining a height of 60 feet; hardy, as far south as Melbourne; in forest valleys likely of fair celerity of growth. In favourable localities it bears fruit in seven years. The nuts have the taste of hazels.

Maclura aurantiaca, Nuttall.

The Osage Orange, or North American Bow Wood, or Yellow Wood. Texas, Arkansas, Louisiana. This thorny deciduous shrub or tree can be well trained into hedges. It is unisexual, and will in favourable localities on rich river banks attain a height of 60 feet, with a stem 2 to 3 feet thick, thus becoming available as a timber tree. It resists severe frosts. The saplings furnish stakes for vines, which are very lasting. The wood serves well for bows, buggy shafts, carriage poles, and similar articles. Not readily subject to blight or attacks of insects. It produces from the root a yellow dye. Foliage fit for silkworms. M. tinctoria (D. Don), which furnishes the Fustic wood of Central and South America.

Maclura excelsa, Planchon.

West Africa, on mountains up to 3,000 feet elevation. Height of tree to 150 feet. The wood is remarkably durable and tough, beautifully dark brown and veined. Birds feed on the fruit.

Maclura Mora, Grisebach.

North Argentina. A high tree. Wood greatly esteemed for its density and toughness; fruit edible (Dr. Lorentz).

Magnolia hypoleuca, Siebold.

Japan. A stately tree, with very large and whorled leaves. Trunk 1 foot in diameter. Wood remarkably flexile; used for many kinds of utensils. Worthy of introduction as a magnificent garden object (Christy).

Magnolia macrophylla, Michaux.

Eastern States of North America. Although not cultivated for any special purposes of the arts or of technics, yet this tree is admitted here into this list as one of the grandest of its kind, as well in foliage as flowers. It attains a height of 40 feet; its leaves are from 1 to 3½ long, while its flowers attain a diameter of fully 1 foot. M. grandiflora, L., attains on the Mississippi a height of 80 feet.

Mallotus Philippinensis, J. M. (*Rottlera tinctoria,* Roxburgh.)

South Asia and East Australia, in jungle country, extending into New South Wales. A bush or tree attaining, according to Mr. O'Shanesy, a height of 60 feet. Though not of great importance, this plant should not be passed on this occasion, inasmuch as the powdery substance investing the seed capsules constitutes the Kamala, which can be employed not only as an orange dye, but also as an anthelminthic remedy. The Hindoo silk-dyers use it for an orange colour, obtained by boiling the Kamala with carbonate of soda.

Mangifera indica, Linné.

South Asia. An evergreen tree, up to 70 feet high. Possibly the Mango Tree could be made to bear its delicious fruit in the warm and humid forest regions as far south as East Gippsland. In the Himalayas its culture for fruit ascends to 3,500 feet outside the tropics.

Manihot Aipi, Pohl.

The Sweet Cassava. Tropical South America, but traced as far south as the Parana River. The root is reddish and harmless; it can therefore be used, unlike that of the following species, without any further preparations than boiling, as a culinary esculent, irrespective of its starch, being also available for tapioca. Both are somewhat woody plants, several feet high, and they are too important to be left altogether unnoticed on this occasion, although we have no evidence that they will prove productive in a temperate clime. The Aipi has ligneous, tough fibres, stretching along the axis of the tubers, while generally the roots of the following species are free of this central woody substance.

Manihot utilissima, Pohl.

The Bitter Cassava or Tapioca Plant. Tropical South America. Closely allied to the former, producing varieties with roots of poisonous acridity and with tubers perfectly harmless. The tubers attain a length of 3 feet; they can be converted into bread or cakes, the volatile poison of the milky sap being destroyed through pressing of the grated root in the first instance, and the remaining acridity is expelled by the heating process. The starch, heated in a moist state, furnishes the tapioca. Manihot is abundantly cultivated at Caracas, where the singularly uniform temperature throughout the year is only 60° to 70° F. It is a very exhausting crop, and stands thus in need of rich soil and manuring. The propagation is effected by

cuttings from the ligneous part of the stem. The soil destined for Cassava must not be wet. In warm countries the tubers are available in about eight months, though they still continue to grow afterwards. The growth of the plant upwards is checked by breaking off the buds. The Bitter Cassava is the more productive of the two. The yellowish tubers attain sometimes a weight of 30 lbs. They do not become soft by boiling like Aipi.

Maoutia Puya, Weddell.

India, on mountains up to 4,000 feet. It is taller than Boehmeria nivea, and furnishes a similar fibre. This shrub belongs to a tribe of the Nettle order, not possessing burning acridity. None of the true Nettles, such as the Girardinias, nor allied stinging plants have been recommended in this index, although from some an exquisite fibre is derived, as the writer wishes to guard against the introduction of any burning species, which possibly might disseminate itself in a mischievous manner, and then probably could not again be suppressed.

Maranta arundinacea, Linné.

The true Arrowroot Plant. West India, Florida, Mexico to Brazil. The plant is introduced into this list not without hesitation, as it seems to require a tropical clime to attain perfection. It furnishes most of the West Indian arrowroot, although other species, such as M. nobilis, M. Allouya, M. ramosissima, are also cultivated for a similar starch of their tubers. Porcher observes that it still flourishes as far north as Florida, producing even in the pine-lands from 200 to 300 bushels of tubers to the acre. M. Indica, Tuss., is merely a variety.

Marlea Vitiensis, Bentham.

New South Wales and Queensland. A middle-sized tree, generally with a gouty trunk; wood bright yellow with fine undulating rings, black towards the centre. Fruit edible (P. O'Shanesy).

Marliera glomerata, Bentham. (*Rubachia glomerata,* Berg.)

The Cambuca of sub-tropical Brazil. The fruits attain the size of apricots, and are much used for food (Dr. Rosenthal).

Marliera tomentosa, Cambessedes.

Extra-tropical Brazil. The Guaparanga. The sweet berries of this tall shrub are of the size of cherries.

Matricaria Chamomilla, Linné.

The annual Chamomile. Europe, North and Middle Asia. A highly useful herb in medicine. In many parts of the European continent it is much more extensively used than the ordinary perennial Chamomile. The infusion of the flowers has rather a pleasant taste without strong bitterness. The flowers serve as a tonic and especially as a sudorific, and possess a peculiar volatile oil.

Matricaria glabrata, Candolle.

The South African Chamomile. This annual herb is there in renown as an excellent substitute for the European Chamomile (Dr. Pappe).

Mauritia flexuosa, Linné.

From Guiana to Peru and Brazil. This noble Palm is known to ascend up to 4,000 feet along the Essequibo. As Palms, like Bamboos, prove to be among the hardier of tropical plants, experiments for naturalising M. vinifera, Martius, might also be instituted. This attains a height of 150 feet, leaves 15 feet long, and spouts from the incised stem a copious viny sap.

Maytenus Boaria, Molina. (*Boaria Molinæ*, Candolle; *Maytenus Chilensis*, Candolle.)

Chili. An evergreen tree, assuming in the southern provinces considerable dimensions. Wood extremely hard. Cattle and sheep browse with predilection on the foliage; hence the trees are cut down when in protracted snowfalls or in times of drought forage becomes scarce (Dr. Philippi).

Medicago arborea, Linné.

South Europe, particularly Greece. This shrubby yellow Lucerne is of value for dairy farmers, as it much promotes the secretion of milk. This genus includes several other species valued as pasture.

Medicago lupulina, Linné.

The Black Medick. Europe, Asia, and North America. An annual or biennial pasture herb, easily grown and not without nutritive importance. Langethal observes, "It effects for argillaceous soils what the White Clover does for sandy moist soils. It will even succeed in moory ground, provided such contains some lime. It suits also particularly for sheep pastures."

Medicago sativa, Linné.*

Orient; now spread through Middle and South Europe and Middle Asia. The purple Medick, Alfalfa, or Lucerne. A perennial fodder herb of great importance, and largely utilised in most countries with a temperate clime, perhaps descended from the English Medicago falcata, which also deserves naturalisation. Lucerne keeps green and fresh in the hottest season of the year, even in dry and comparatively barren ground and on coast sands, but developes itself for field culture with the greatest vigour on river banks or when subjected to a judicious system of irrigation, particularly in soil rich in lime. Its deeply penetrating roots render the plant particularly fit for fixing fenced embankments or hindering the washing away of soil subject to occasional inundations. Much iron in the soil or stagnant water is detrimental to lucerne culture, while friable warm soil much promotes its growth. Langethal records instances of lucerne having yielded on the same field under favourable circumstances for fifteen years four or five cuts annually. For sandy tracts a yellow variety (M. media, Pers.) deserves preference. To show how enormously plants are affected in their mineral constituents by difference of soil, Lace has analysed the ashes of lucerne (*a*) from granitic soil, (*b*) chalky soil with flints, (*c*) clayey with chalk, (*d*) very chalky, and found—

	a	*b*	*c*	*d*
	°/o	°/o	°/o	°/o
Silicic acid	·99	·41	·47	·58
Ferric oxide	·76	1·05	·29	·60
Magnesium carbonate	9·89	7·15	10·11	9·05
Calcium sulphate	4·50	3·04	7·51	6·80
„ phosphate	14·94	8·11	10·66	19·71
„ carbonate	13·42	48·15	49·68	30·19
Potass carbonate	48·42	29·19	20·60	26·09
Potass and soda chlorides	6·67	2·90	·68	6·98

Melaleuca ericifolia, Smith.

South-East Australia. This tall shrub or bushy tree is of importance for consolidating muddy shores; almost like mangroves, it will live in very salt ground and in water. It yields also a comparatively large quantity of cajaput oil. It admits of easy transplantation in an up-grown state. *Myoporum insulare* (R. Brown) can in a like manner be used in tree plantations for the sake of shelter on wet saline soil. *Melaleuca linariifolia* and *M. genistifolia* can also be grown in swamps for hygienic

purposes and to subdue paludal malaria or fever-provoking effluvia. The branches of M. ericifolia furnish the best material in Victoria for lasting easily-worked garlands.

Melaleuca leucadendron, Linné.

The Cajaput Tree of India, North and East Australia as far south as 34° south latitude. This tree attains a height of 80 feet, with a stem up to 4 feet in diameter, on tidal ground; it can with great advantage be utilised for such areas for subduing malarian vapours in salt swamps where no Eucalyptus will live. Its bark protects it against conflagrations. The wood is fissile, hard, and close-grained, regarded as almost imperishable underground, and resists the attacks of the termites. It is well adapted for posts, wharf-piles, ship-building, and various artizans' work.

Melaleuca parviflora, Lindley.

Extra-tropical Australia. A tall bush or small tree. One of the most important plants for fixing moving coast sands.

Melaleuca styphelioides, Smith.

East Australia. Height of tree to 60 feet, stem diameter to 2½ feet. The timber is hard, close-grained, and stands well in damp situations. It is said that the timber has never been known to decay (Queensland Exhibition, 1878). Tree adapted for swamps.

Melaleuca trichostachya, Lindley.

Tropical East Australia. A small tree deserving attention as eligible for saline land, on which it can be raised much more easily than Myoporum insulare. M. Thozet observes that it occurs in places where it is bathed by the tides; also that large saplings without roots can be transplanted. Thus it may be destined to aid with several of its congeners and with Salicornias, Avicennias, Ægiceas, Batis, and some other plants to reclaim low muddy shore lands from sea-floods. M. squarrosa, Smith, of South-East Australia, can also be grown in swamps to subdue miasmata. It attains exceptionally the height of 60 feet with a stem of 2 feet in diameter.

Melia Azedarach, Linné.

Called "the Pride of India." South Asia, North and also East Australia, and there to far extra-tropical latitudes. As an avenue tree not without importance, because it will successfully cope with dryness of clime and sterility of

soil. It recommends itself also for retaining the foliage till very late in the season, and for producing abundance of fragrant flowers which may perhaps be worth distilling for essential oil. A black-fruited Melia seems as yet little known. The wood is considered of value for some kinds of musical instruments.

Melianthus major, Linné.

South Africa. The leaves of this stately plant are very efficacious as antiseptics, also in cases of scald head, ringworm, and various other cutaneous diseases (Dr. Pappe). Its effect of promoting granulation is very remarkable (Dr. A. Brown). Flowers rich in honey, as indicated by the generic name.

Melica altissima, Linné.

North-Eastern Europe, Middle Asia. This perennial grass has recently come into use as pasture.

Melica ciliata, Linné.

Europe and Middle Asia. A perennial fodder grass, particularly desirable for sheep. Best for dry gypsum or calcareous ground.

Melica nutans, Linné.

The Pearl Grass. Europe and North and Middle Asia, enduring an Alpine clime, and living also in the shade of forests. It produces suckers, and affords good herbage in woody regions; so, also, does M. uniflora. Several other species are on record from various parts of the globe, among which M. mutica, of North America, seems to deserve special attention.

Melicocca bijuga, Linné.

Central America, on mountains. So many sapindaceous trees of the Cupania series have been shown by my own experiments to be hardy in a climate like that of Victoria, that now also this important member of the series could be admitted into this list. The pulp of the fruit is of grape taste; the seeds can be used like sweet chestnuts.

Melilotus alba, Desrousseaux.

The Cabul or Bokhara Clover. Middle and Southern Europe, North Africa, Middle Asia. A biennial herb. On account of its fragrance it is of value for admixture to hay. It is also a good bee-plant. Flowers white. Odorous principle: cumarin.

Melilotus cœrulea, Lamarck.

South Europe and North Africa. An annual, very odorous fodder herb. It forms an ingredient of the green Swiss cheese, which owes its flavour and colour chiefly to this plant.

Melilotus officinalis, Desrousseaux.

Europe and Middle Asia. Also biennial, or lasting through several years if prevented from flowering. Contains also cumarin. An allied species is M. macrorrhiza, Pers. Both serve purposes similar to those for which M. alba is employed. Grown on the coast it becomes less odorous.

Melissa officinalis, Linné.

The Balm Herb. South Europe and Middle Asia. A perennial herb, valuable for its scent, which depends on a peculiar volatile oil. It is also valuable as a bee plant.

Melocanna bambusoides, Trinius.

The Berry-bearing Bamboo, from Chittagong and other mountainous parts of India, as well as of the Archipelagus. The fruit is very large, fleshy, like an apple, and contains a seed which is said to be very pleasantea ting (Masters). It is a thornless bamboo, growing on dry slopes of hills. Height up to 70 feet; circumference towards base, 1 foot; growth beautifully erect.

Melocanna humilis, Roeper.

India. More slender than the preceding species, and attaining only a height of 20 feet.

Melocanna Travancorica. (*Beesha Travancorica,* Beddome.)

A new bamboo from Travancore, worthy of introduction.

Mentha laxiflora, Bentham.

Victoria and the most southern parts of New South Wales. This, the Australian Forest Mint, furnishes a peculiarly pleasant oil, not dissimilar to that of peppermint. A fair oil can also be distilled from *M. Australis* (R. Brown), the common River Mint of South-East Australia.

Mentha piperita, Linné.*

The Peppermint. Middle Europe. This well-known perennial herb is important for its peculiar essential oil. This distilled oil is in considerable demand, and would be best obtained from plants cultivated in the mountain regions or

naturalised along the forest rivulets. Eminent authorities refer the Peppermint as a variety to Mentha aquatica (L.), the Water Mint of Europe, North Africa, West and North Asia, from which the true Crisp Mint (M. crispa, L.) is again derived, as well as the Bergamot Mint (M. citrata, Ehrh.).

Mentha Pulegium, Linné.

The true Penny-royal. Europe, Western Asia, North Africa. A perennial scent-herb, yielding a peculiar ethereal oil. It likes moist soil. To be avoided on pastures.

Mentha rotundifolia, Linné.

Middle and South Europe, North Africa, Western Asia. Fond of wet places, which by the culture of this and other mints may be profitably utilised. In odour this mint approaches to Melissa. The French and Italian Crisp Mint is partly derived from this species. Closely allied to the following, and often regarded as a variety of M. viridis, L.

Mentha silvestris, Linné.

The Horse Mint. Europe, North Africa, temperate Asia. Perennial. One of the Crisp Mints is derived from this species.

Mentha viridis, *Linné.*

The Spear Mint. Middle and South Europe. Perennial. A particular sort of Crisp Mint (M. crispata, Schrad.) belongs to this species. Some Australian Mints—M. Australis, M. gracilis, and M. saturejoides, R. Br.—also yield oil of good flavour; but M. laxiflora, Benth., is far the largest and most abundant of these Australian plants.

Menyanthes trifoliata, Linné.

Inappropriately called the Bog Bean. Europe, North and Middle Asia, North America. In springy and spongy bogs. A perennial herb of great beauty, which could be naturalised with facility in our Alps. The root is starchy. The whole plant is pervaded with a bitter principle, largely derived from menyanthin. The plant is used medicinally as a tonic and febrifuge.

Meriandra Abyssinica, F. v. Mueller. (*M. Benghalensis*, Bentham.)

Abyssinia, on high mountains. A shrub of penetrating odour, utilised much like sage.

Mesembrianthemum acinaciforme, Linné.

The Hottentot Fig of South Africa. Under the same vernacular name is also comprised the distinct M. edule, L. Both., together with the Australian M. æquilaterale, Haworth, which extends also widely along the American west coast, and should be transferred into any of the most inhospitable desert regions, as they afford in the inner part of their fruit a really palatable and copious food.

Mesembrianthemum capitatum, Haworth.

South Africa. This perennial species, from the readiness and quickness of its growth, and from the abundance of its seeds and their easy dispersion, is one of the best for staying any rolling sea-sand (Dickinson). *M. pugioniforme* (Linné) and many other species serve the same purpose.

Mesembrianthemum crystallinum, Linné.

South Africa. Recently recommended as a spinach plant. Can be grown on bare sand, which it helps to cover.

Metrosideros tomentosa, A. Cunningham.

North Island of New Zealand. Could be grown for timber on rocky sea-shores. Height to 80 feet, trunk stout, but comparatively short. The timber, according to Mr. Kirk, deserves attention as one of the most durable for the framework in ship-building, for jetties, docks, sills. Other species with dense wood, occurring in New Zealand, are M. lucida (Menzies) and M. robusta (A. Cunn.), all ornamental trees with crimson flowers.

Microseris Forsteri, J. Hooker.

The Native Scorzonera of extra-tropical Australia and New Zealand. A perennial herb deserving attention, as likely its root would enlarge and improve through culture. On the summits of snowy mountains the plant developes itself most luxuriantly. The Australian aborigines use the root for food. The plant would prove hardy in Middle Europe.

Milium effusum, Linné.

English Millet Grass. Europe, North and Middle Asia, North America. Perennial, suited for damp forest land particularly, the pasture capabilities of which it enhances. On river banks it attains a height of 6 feet. It is relished by cattle. The seeds can be used like millet, the stems for the manufacture of superior straw hats. It is a great favourite

with pheasants and many other birds for the sake of its seeds, which ripen early in the season.

Mimosa rubicaulis, Lamarck.

India. A hedge bush, almost inapproachable. It has proved hardy at the Botanic Garden of Melbourne.

Monarda didyma, Linné.

North America. A perennial odorous herb, producing the medicinal Osnego or Beebalm Tea. M. punctata, L., and M. fistulosa, L., with several others, are also of very strong scent.

Monodora Angolensis, Welwitsch.

Tropical West Africa, up to the comparatively cool elevation of 3,500 feet. A tree attaining 30 feet in height. The pleasantly aromatic seeds come into the market, like those of the following species; they measure about half an inch in diameter and are numerously produced.

Monodora Myristica, Dunal.

West Africa. A small tree. The seeds serve as nutmegs.

Morchella esculenta, Persoon. (*M. conica*, Persoon.)

Europe, Asia, North and Central America. With M. semilibera this Morel has been found in Victoria and New South Wales; its spread should be encouraged by artificial means, as it is a wholesome esculent. European superior species, probably admitting of introduction, are: M. Gigas, Pers.; M. rimosipes, D. C.; M. Bohemica, Krombh; M. deliciosa, Fries, which extends to Java; M. patula, Pers., the Bell Morel; but several others occur there or in other parts of the globe. Though these fungi show a predilection for pine forest, they are not dependent on them; thus the writer found M. esculenta in Eucalyptus forests, and this late in the autumn. They can all be dried and preserved for culinary purposes.

Moringa pterygosperma, Gaertner.

The Horse-Radish Tree of India, abundant into the middle regions of the mountains. The long pods are edible; the seeds are somewhat almond-like and rich in oil. M. aptera, Gaertner, occurs from Abyssinia and Egypt to Arabia and Syria.

Morus alba, Linné.*

The White Mulberry Tree. China. This tree in several

varieties provides the food for the ordinary Chinese silk insect (Bombyx Mori).* Silk was produced in Italy 600 years ago, and there this branch of industry has flourished ever since. In China, silk has been reeled for 4,500 years. This may demonstrate the permanency of an industry which we wish to establish here extensively under a similar sky. "One pound of silk is worth its weight in silver, and this pound may be produced (so far as the food of the Bombyx is concerned) from thirty pounds of mulberry leaves or from a single tree, which thus may be brought to yield annually the material for 16 yards of Gros de Naples." The White Mulberry Tree is of extremely easy growth from cuttings, also readily raised from well-matured seeds. It is usually unisexual, and attains finally a very large size. It can be grown in climes where olives will no longer thrive. Spots for mulberry culture must not be over-moist, when the leaves are to be utilised for the Bombyx. In 1870, according to the *British Trade Journal*, the produce of cocoons amounted in Europe to £16,588,000; in Asia to £28,112,000; in Africa to £44,000; in the South Sea Islands to £24,000; in America to £20,000;—thus giving a general total of £44,788,000. In 1875 the yield of raw silk in the district of Rajshahye (British India) was estimated at £400,000, employing about 12,000 people, the plantations extending approximately over 150 square miles (Dr. S. Forbes Watson). In that district alone a quarter of a million of people derived their support from the trade and other branches of the silk industries. Superior varieties of mulberry can be grafted with ease on ordinary stock. M. Indica (L.), M. macrophylla (Morett.), M. multicaulis (Perott.), M. Morettiana (Jacq.), M. Chinensis (Bertol), M. latifolia (Poir.), M. Italica (Poir.), M. Japonica (Nois.), M. Byzantina (Sieb.), M. nervosa (Del.), M. pumila (Nois.), M. tortuosa (Audib.), as well as the Constantinople Mulberry, are merely forms of M. alba, to which probably also M. Tartarica (L.) and M. pabularia (Jacquin.) belong. The variety known as M. Indica produces black fruits. The planting of mulberry trees has recently assumed enormous dimensions in California, where in 1870 between seven and eight millions were planted. The process of rearing the silk insect is simple and involves no laborious exertions. The cocoons, after they have been properly steamed, dried, and pressed, readily find purchasers in Europe, the price ranging according to quality from 3s. to 6s. per lb. The eggs of the silkworm sell at a price from 16s. to £2 per ounce, and in 1870 Japan had to provide two millions of ounces of

* The following notes were written for the Victorian edition of this work.

silk ova for Europe, where the worms had extensively fallen victims to disease. Instances have been recorded in California, where eight tons of leaves were gathered in the first year from the mulberry trees of one acre, and thirty tons in the next year. As an example of the profit thus to be realised, a Californian fact may be cited, according to which £700 were the clear gain from 3½ acres, the working expenses having been £93. The Commissioner of Agriculture of the United States has estimated that under ordinary circumstances an acre should support from 700 to 1,000 mulberry trees, producing 5,000 lbs. of leaves fit for food when four years old. On this quantity of leaves can be reared 140,000 worms, from which ova at a net profit ranging from £80 to £240 per acre will be obtained by the work of one person. Mr. C. Brady, of Sydney, thinks the likely proceeds of silk culture to be from £60 to £150 for the acre. The discrepancies in calculations of this kind are explained by differences in clime, soil, attention, and treatment.

The White Mulberry Tree has been very copiously distributed from Melbourne Botanic Garden for many years. A very palatable fruit is obtained from a variety cultivated in Beloochistan and Afghanistan. Morus Tartarica (L.) resembles M. alba. Its juicy fruit is insipid and small. The leaves are not generally used for silkworms.

The results of Mr. Brady's experience on the varieties of the Morus alba are as follows: In the normal form the fruits are white with a purplish tinge more or less deep; the bark is pale; the leaf is also of a pale hue, not very early nor very tender, nor very abundant. It may be grown on moist ground as long as such is drained, or it will live even on poor, loose, gravelly soil, bordering on running water. The Cevennes variety is a free grower, affords a large quantity of leaves, though of rather thick consistence; all varieties of the Morus Bombyx like these leaves at all stages of their age. It is also called the Rose-leaved variety. The silk which it yields is substantial in quantity and also good in quality. It does best on rich dry slopes. The bushy Indian variety has a fine leaf of a beautiful green, which, though light in weight, is abundantly produced. It can be cut back to the stem three or four times a year; the leaves are flat, long, and pointed, possess a fine aroma, and are relished by every variety of the ordinary silk insect, though all do not thrive equally well on it. The silk derived from this variety is excellent, but not always so heavy in quantity as that produced from the rosy variety. It prefers rich, low-lying bottoms, is a greedy feeder, but may thus be made to cover an

extraordinary breadth of alluvial or manured land in a marvellous short space of time. At Sydney Mr. Brady can provide leaves from this Indian variety all through the year by the removal of cuttings, which will strike their roots almost at any season. It also ripens seeds readily and should be kept at bush size. It requires naturally less space than the other kinds. A fourth variety comes from North China; it has heart-shaped, flat, thickish leaves, which form very good food for the silkworm. Mr. Brady, as well as Mr. Martelli, recommends very particularly the variety passing under the name of Morus multicaulis for the worms in their earliest stages. The former recommends the Cape variety also; the latter wishes also the variety called Morus Morettiana to be used on account of its succulent nutritious foliage, so well adapted for the insect while yet very young, and also on account of producing the largest amount of food within the shortest time. The Manilla variety, known as Morus multicaulis, comes several weeks earlier into bearing than most other sorts, and should therefore be at hand for early hatched worms.

The Muscardine Disease is produced by Botrytis Bassiana, while the still more terrible Pebrine Disease is caused by a minute vibrio-like organism. Countries like ours, happily free from these pests, can thus rear healthy silk ova at a high premium for exportation.

The White Mulberry Tree with others, offering food to the silkworms, such as the Osage-orange, should be planted copiously everywhere for hedges or copses.

Morus celtidifolia, Humboldt.

From Peru to Mexico, ascending to 7,000 feet. The fruit of this Mulberry Tree is edible. M. insignis, Planchon, from New Granada, is a similar species.

Morus nigra, Linné.*

The Black Mulberry Tree. South Russia and Persia. Highly valuable for its pleasant refreshing fruits. It is a tree of longevity, instances being on record of its having lived through several centuries. It is also very hardy. Mr. John Hodgkins regards it as a superior tree for sandy coast ridges. The leaves also of this species afford food for the ordinary silk moth. The tree occurs usually unisexual. M. atropurpurea, Roxb., from Cochin China, is an allied tree. The cylindrical fruit spike attains a length of 2 inches.

Morus rubra, Linné.

The Red Mulberry Tree of North America; the largest of

the genus, attaining a height of 70 feet; it produces a strong and compact timber, of wonderful endurance underground, hence in demand for posts and railing ties (General Harrison).

Mucuna Cochinchinensis, Bentham. (*Macranthus Cochinchinensis,* Loureiro.)

A climbing annual, which can be reared in the open air in England. Pods, cooked as a vegetable, like kidney beans (Johnson.)

Musa Cavendishii, Lambert.* (*Musa regia,* Rumph; *Musa Chinensis,* Sweet; *Musa nana,* Loureiro.)

The Chinese Banana. A comparatively dwarf species, the stem attaining only a height of about 5 or 6 feet. Its robust and dwarf habit render it particularly fit for exposed localities, and this is one of the reasons why it is so extensively cultivated in the South Sea Islands. The yield of fruit is profuse (as much as 200 to 300 fruits in a spike), and the flavour excellent. This, as well as M. sapientum and M. paradisiaca, still ripens its fruits in Madeira and Florida.

Musa corniculata, Rumph.*

Insular India. Fruits as large as a good-sized cucumber; skin thin; pulp reddish white, firm, dry, sweet; an excellent fruit for cooking (Kurz). The Lubang variety is of enormous size.

Musa Ensete, Gmelin.

Bruce's Banana. From Sofala to Abyssinia, in mountain regions. This magnificent plant attains a height of 30 feet, the leaves occasionally reaching to the length of 20 feet, with a width of 3 feet, being perhaps the largest in the whole empire of plants, exceeding those of Strelitzia and Ravenala, and surpassing even in quadrate measurement those of the grand water-plant Victoria Regia, while excelling in comparative circumference also the largest compound frond of Angiopteris evecta or divided leaf of Godwinia Gigas, though the compound leaves of some palms are still larger. The inner part of the stem and the young spike of the Ensete can be boiled to serve as a table esculent, but the fruit is pulpless. This plant produces no suckers, and requires several years to come into flower and seed, when it dies off like the Sago Plant, the Caryota Palm, and others, which flower but once without reproduction from the root.

Musa Livingstoniana, Kirk.

Mountains of Sofala, Mozambique, and the Niger regions. Similar to M. Ensete; seeds much smaller. Possibly requiring no protection in favourable places in warm temperate climes.

Musa paradisiaca, Linné.*

The ordinary Plantain or Pisang. India. Among the most prolific of plants, requiring the least care in climes adapted for its growth. Stem not spotted. Bracts purple inside. In this, as well as the foregoing and the following, new shoots are produced from the root, to replace annually the fruit-bearing stem. The fruit of this is often prepared by some cooking process. Very many varieties are distinguished, and they seem to have sprung from the wild state of M. sapientum. The writer did not wish to pass this and the allied plants unnoticed, as they will endure the clime in the warmer localities of the temperate zone, where under more careful attention they are likely to mature their fruit with regularity. They require rich and humid soil. Plantain meal is prepared by simply reducing the dried pulp to powder. It is palatable, digestible, and nourishing. M. sapientum, L., the ordinary Banana or Sweet Plantain, is a variety. It is one of the most important plants yielding nutritious delicious fruits. The stem is spotted. Bracts green inside. The leaves and particularly the stalks and the stems of this and other species of Musa can be utilised for producing a fibre similar to Manilla hemp. The fruit of this is used chiefly unprepared; it is generally of a yellow colour. Numerous varieties are distinguished. As much as a hundredweight of fruit is obtained from a plant annually in tropical climes. At Caracas, where the temperature is seldom much above or below 60° F., the Plantain and Banana plants are very productive, being loaded with fruits 12 to 15 inches long, on mountains about 5,000 feet high. In the dry Murray regions of South-East Australia the winter temperature seems too low for the successful development of these plants except on sheltered spots, but Bananas still ripen under the shelter of limestone cliffs as far south as Swan River in West Australia. Requires infinitely less care within its geographic latitudes than the potato; contains along with much starch also protein compounds. Many Indian populations live almost exclusively on the fruit.

Musa simiarum, Rumph. (*M. corniculata*, Loureiro; *M. acuminata*, Coll.).

From Malacca to the Sunda Islands. About half a hundred

marked varieties of this species, called mainly Peesangs in India, are under cultivation there, especially on the Archipelagus, while M. sapientum occurs wild more frequently on the mainland. Though the latter is principally cultivated on the Indian continent, yet it never equals in delicacy the cultivated forms of M. simiarum, the fruit of which sometimes attains a length of 2 feet (Kurz).

Musa troglodytarum, Linné. (*M. uranoscopos*, Rumph.)

India, and apparently indigenous also in the Fiji and other islands of the Pacific Ocean. The fruit stalk of this species stands upright; the edible fruits are small, reddish, or orange-coloured; pulp gamboge yellow, mawkish sweet (Kurz). The Chinese M. coccinea, Ait., a dwarf ornamental species, has also the fruit-spike straight.

Myoporum lætum, Forster.

New Zealand, where it is called Ngaio by the aborigines. As a shelter tree it is equal to M. insulare for the most exposed parts of the coast. It is excellent for shade, and its wood takes a fine polish. It can be raised on the beach from cuttings. Uprooted it will produce new roots if covered in near the sea. Sheep and horses browse on the foliage.

Myrica cerifera, Linné.

The Wax Myrtle. Sandy sea-coast of North America. This shrub helps to bind the rolling sand; it has fragrant leaves; the fruits are boiled, and the floating wax, which can be converted into candles, is skimmed off. In Patagonia, Argentina, and Chili the scrophularineous Monttea aphylla, Bentham (Oxycladus aphyllus, Miers), yields vegetable wax from it branches (Lorentz).

Myrica cordifolia, Linné.

South Africa. This bushy plant arrests the influx of the sea sand; it also yields remuneratively wax from its fruits.

Myrica Faya, Aiton.

Madeira, Azores and Canary Islands. A small tree. The drupaceous fruits are used for preserves. M. sapida, Wallich, an Indian mountainous species, has also edible fruits.

Myrica quercifolia, Linné.

South Africa. This and M. cordifolia and the following are

the principal wax-bushes there. Many other species from different parts of the globe are available for trial culture, but none have as yet been discovered in Australia.

Myrica serrata, Lamarck.

South Africa. Shrub only about 3 feet high. The Myrica wax is heavier, harder, and more brittle than bees'-wax, but melts easier. It is obtained from the fruits throughout the cool season. The sowing of seeds is done after the first rain of the cool months has steadied the sand. The plant can also be multiplied from cuttings. The sub-terraneous trunk is creeping, and in age of considerable length (Dr. Pappe).

Myrrhis odorata, Scopoli.

The Sweet Chervil or Cicely. Mountains of Middle and South Europe and Asia Minor, particularly in forests. A perennial aromatic herb, used for salad and culinary condiments. It could be naturalised in the forests, and would endure an Alpine climate; a second species, M. occidentalis, Benth., occurs in Oregon.

Myrtus acmenoides, F. v. Mueller.

Queensland. The fragrant leaves of this and of M. fragrantissima used for flavouring tea, according to Mr. P. O'Shanesy.

Myrtus communis, Linné.

Countries around the Mediterranean Sea. The Bridal Myrtle. This bush of ancient renown should not be passed; it is industrially in requisition for myrtle wreaths.

Myrtus edulis, Bentham. (*Myrcianthes edulis,* Berg.)

Uruguay. A tree attaining a height of about 25 feet. Berries of 1½ inches diameter, of pleasant taste.

M yrtus umal Molina.

South Chili. A tree fully 100 feet high in the virgin forests. Wood very hard and heavy, much sought for press screws, wheel-spokes, and select implements (Dr. Philippi).

Myrtus meli, Philippi.

South Chili. Of the same use as the foregoing species, and in this manner most favourably contrasting with the numerous other myrtaceous trees of Chili.

Myrtus nummularia, Poiret.

The Cranberry Myrtle. From Chili to Fuegia, also in the Falkland Islands. This trailing little plant might be transferred to the turfy moors of Alpine mountains. Sir J. Hooker describes the berries as fleshy, sweet and of agreeable flavour. Allied species occur in the cold zone of the Peruvian Andes.

Myrtus tomentosa, Aiton.

India and China. This showy shrub ascends to 8,000 feet high. The berries are dark purple, of cherry size, pulpy, and of aromatic sweetness. Various other Myrtles with edible berries are known from different warm countries.

Myrtus ugni, A. Gray.

The Chilian Guava. A hardy shrub, freely bearing its small but pleasantly aromatic berries.

Nageia (Podocarpus) amara, Blume.

Java, on high volcanic mountains. A large tree, sometimes 200 feet high.

Nageia (Podocarpus) Andina, Poepping. (*Prumnopithys elegans,* Philippi.)

The Lleuque of Chili. A stately tree with clusters of edible cherry-like fruits. The wood is yellowish and fine-grained, and is chosen for elegant furniture work.

Nageia (Podocarpus) bracteata, Blume.

Burma, Borneo, Java, up to 3,000 feet. Generally 80 feet high, with a straight trunk and horizontal branches. The close-grained wood is highly prized. The allied N. neriifolia from the Himalayas has proved hardy at Melbourne.

Nageia (Podocarpus) Chilina, Richard.

The Manniu and Lahual of the Chilians. Height to 100 feet, with corresponding thickness of stem. Wood white, of excellent quality.

Nageia (Podocarpus) coriacea, Richard.

West India. This tree attains a height of 50 feet, and advances to elevations of 8,000 feet. Other species of both hemispheres should be tested.

Nageia (Podocarpus) cupressina, R. Brown.

Java and Philippine Islands. Height of tree 180 feet; furnishing a highly valuable timber.

Nageia (Podocarpus) dacrydioides, A. Richard.

In swampy ground of New Zealand; the "Kahikatea" of the Maories, called White Pine by the colonists. Height of tree 150 feet; diameter of stem 4 feet. The white sweet fruit is eaten by the natives; the wood is pale, close-grained, heavy. It will not stand exposure to wet, but is one of the best for flooring-boards. The strength is equal to that of Rimu, according to Kirk; but it is more readily attacked by boring insects.

Nageia (Podocarpus) elata, R. Brown.

East Australia. A fine timber tree attaining a height of 80 feet with a stem 2 feet in diameter. The timber is soft, close-grained, free from knots, much used for joiners' work, also for spars. Market price in Brisbane £3-5 to £3-10 per 1,000 superficial feet (Queensland Exhibition, 1877).

Nageia (Podocarpus) elongata, L'Heritier.

South Africa. With N. Thunbergi and with Erythrina Caffra and Oreodaphne bullata, this is the tallest tree of Capeland and Caffraria, although it does not advance beyond 70 feet. The yellowish wood is highly valuable, deal-like, not resinous. The stems can be used for top-masts and yards of ships.

Nageia (Podocarpus) ferruginea, Don.

Northern parts of New Zealand. The Black Pine of the colonists; native name "Miro." Height of tree 80 feet; it produces a dark red resin of a bitter taste. The wood is of a reddish colour, very hard; will stand exposure to sea-water. Fruit solitary.

Nageia (Podocarpus) Lamberti, Klotzsch.

Brazil. A stately tree, yielding valuable timber.

Nageia (Podocarpus) Purdieana, Hooker.

Jamaica, at 2,500 to 3,500 feet. This quick-growing tree attains a height of 100 feet.

Nageia (Podocarpus) rubigena, Lindley.

Southern Chili, generally a companion of N. Chilina, with which it agrees in its dimensions and the utility of its timber.

Nageia (Podocarpus) spicata, Brown.

Black Pine or Matai of New Zealand. Fruit spicate. Tree 80 feet high; wood pale or reddish, soft, close, and durable; used advantageously for piles, machinery, stringers, braces, millwrights' work, house blocks, railway sleepers, also weather-boards, flooring-boards (Kirk).

Nageia (Podocarpus) Thunbergi, Hooker.

South Africa. Superior in the quality of its wood to N. pruinosa, E. Meyer, and even N. elongata; it is bright yellow, fine-grained, and very handsome when polished (Dr. Pappe).

Nageia (Podocarpus) Totara, Don.*

New Zealand. A fine tree, 120 feet high, with a stem of 20 feet in circumference; it is called Mahogany Pine by the colonists. The reddish close-grained and durable wood is valuable both for building and for furniture, and is also extensively used for telegraph posts; it is considered the most valuable timber of New Zealand. Used for piles of bridges, wharves and jetties, and in other naval architecture; the heart-wood for a long time resists decay, and the attacks of the Teredo, according to Professor Kirk. It ranks below Kauri in strength, but equals it in durability. It is one of the most lasting woods for railway sleepers. When used for piles, the bark should not be removed from the timber. Many other tall timber trees of the genus Podocarpus or Nageia occur in various parts of Asia, Africa, and America, doubtless all desirable; but the quality of their timber is not well known, though likely in many cases excellent. Nageia is by far the oldest published name of the genus.

Nardostachys Jatamansi, Candolle.

Mountains of Bengal and Nepal. The Spikenard. A perennial herb, famous in ancient times as a medicinal plant. The root contains an ethereal oil and bitter principle. This drug is often also obtained from N. grandiflora, Cand.

Nelumbo lutea, Caspary.* (*Nelumbium luteum,* Willdenow.)

In North America, north to 44°; also in Jamaica. This magnificent perennial water-plant carries with it the type of Nelumbo nucifera, but seems more hardy, and thus better adapted for extra-tropical latitudes, the Pythagorean Bean not descending in Australia naturally beyond 23°, although this species also may perhaps live in the warmer parts of the temperate zone. The tuberous roots of both species resemble

the Sweet Potato and are starchy; the seeds are of particularly pleasant taste. The plants would be of great value as ornamental aquatics. The leaves of N. lutea are from 1 to 2 feet in diameter. The flowers measure ½ to 1 foot across. The capsular fruit contains from twenty to forty nut-like seeds. The plant in congenial spots displaces nearly all other water vegetation by the vigour of its growth.

Nelumbo nucifera, Gaertner.* (*Nelumbium speciosum,* Willdenow.)

The Pythagorean Bean. Egypt; on the Caspian and Aral Seas (46° N.); Persia; through India, where in Cashmere it occurs at an elevation of 5,000 feet; China; Japan; Amur (46° N.); tropical Australia as far south as 23°. The occurrence of this grand plant at the Ima, at Pekin, and at Astrachan proves sufficiently that we can naturalise it in moderately cool climes, as has been done already by Marquis Ginoi at Doccia near Florence. The Nelumbo requires deep water with a muddy bottom. The large white or rosy flowers are very fragrant. The seeds retain their vitality for several years. According to the ancient Egyptian method, they are placed in balls of muddy clay and chaff, and then sunk into the water.

Nepeta Glechoma, Bentham. (*Glechoma hederacea,* Linné.)

Europe, West Asia. The Ground Ivy. Still held in great estimation as a pectoral medicine in some parts of Britain (G. W. Johnson).

Nephelium lappaceum, Linné.

India. This tree furnishes the Rambutan or Rampostan fruit, similar to the Litchi and Longan fruit. As one species of Nephelium is indigenous as far south as Gippsland (Victoria), and as all the species seem to require rather a moist, mild forest clime, than great atmospheric heat, we may hope to bring this tree also in favourable spots of a temperate climate to perfect bearing.

Nephelium Litchi, Cambessedes.

South China, Cochin-China, and Philippine Islands. An evergreen tree, producing the Litchi fruit. The pulpy arillus is of extremely pleasant taste, though not large.

Nephelium Longanum, Cambessedes.

India and Southern China. The Longan fruit is obtained from this tree; it is smaller than that of the Litchi tree.

Neurachne Mitchelliana, Nees.

The Mulga Grass. In the desert interior of East and South-East Australia. With its companion, *N. Munroi* (F. M.), eligible as a perennial fodder grass for naturalisation in sandy or dry sterile land. It endures any extent of drought, but requires heavy rain to start anew (R. S. Moore). According to Mr. Bailey it produces good pasture feed.

Nicotiana multivalvis, Lindley.

The native tobacco of the Columbia River. An annual. This with the following species can be utilised for certain kinds of tobacco.

Nicotiana Persica, Lindley.

The Shiraz Tobacco. Persia. Annual. This can be brought to perfection only in cool mountain regions. The mode of culture is somewhat different from that of the ordinary tobacco. Moderate irrigation is favourable. The plants when ripe are cut off and stuck into the ground again, until they become yellow. They are then heaped together for a few days in the drying-house. They are then packed into thin strata and placed into bags for pressure and daily turning.

Nicotiana quadrivalvis, Pursh.

The native tobacco of the Missouri. An annual.

Nicotiana repanda, Willdenow.

Cuba, Mexico, Texas. Annual. It is utilised for some of the Havannah tobaccoes.

Nicotiana rustica, Linné.

Tropical America. Annual. Some sorts of Eastern Indian tobacco, of Manilla tobacco, and of Turkey tobacco are derived from this particular species.

Nicotiana Tabacum, Linné.*

The ordinary Tobacco Plant of Central America. Annual. The tobacco plant delights in rich forest soil, particularly where limestone prevails, on account of the potassium compounds which abound in soils of woodlands and also because in the clearings of forests greater atmospheric humidity prevails, needful for the best development of the finest kinds of tobacco. Various districts, with various soils, produce very different sorts of tobacco, particularly as far as flavour is con-

cerned, and, again, various climatic conditions will greatly affect the tobacco plant in this respect. We can thus not hope to produce, for instance, Manilla or Havannah tobacco in colder latitudes; but we may expect to produce good sorts of our own, more or less peculiar; or we may aspire to producing in our rich and frostless forest valleys a tobacco similar to that of Kentucky, Maryland, Connecticut, and Virginia. Frost is detrimental to the tobacco plant; not only, particularly when young, must it be guarded against it, but frost will also injure the ripe crop. Mr. Politz considers the scarcity of dew in some of the districts of Victoria to militate against the production of the best kinds, otherwise the yield as a rule is large, and the soil in many places well adapted for this culture. Leaves of large size are frequently obtained. The moister and warmer northern and eastern regions of that colony are likely to produce the best tobacco, if the final preparation of the leaf for the manufacturer is effected by experienced skill. The cruder kinds are obtained with ease, and so are leaves for covering cigars. Virgin soil, with rich loam, is the best for tobacco culture, and such soil should also contain a fair proportion of lime and potash, or should be enriched with a calcareous manure and ashes, or with well-decomposed stable manure. The seedlings, two months or less old, are transplanted. When the plants are coming into flower, the leading top-shoots are nipped off, and the young shoots must also be broken off. A few weeks afterwards the leaves will turn to a greenish yellow, which is a sign that the plants are fit to be cut, or that the ripe leaves can gradually be pulled. In the former case the stems are split; the drying is then effected in barns by suspension from sticks across beams. The drying process occupies four or five weeks, and may need to be assisted by artificial heat. Stripped of the stalks, the leaf-blades are then tied into bundles to undergo sweating, or a kind of slight fermentation. It does not answer to continue tobacco culture beyond two years on the same soil uninterruptedly. A prominent variety is Nicotiana latissima (Miller) or N. macrophylla (Lehm), yielding largely the Chinese, the Orinoco, and the Maryland tobacco. Latakia tobacco, according to Dyer, is prepared by submitting the leaves for several months to fumigation from fir wood. Substances containing cumarin, particularly the Tonguin Bean (Dipterix odorata), are used to flavour tobacco and snuff. The dangerously powerful nicotin, a volatile acrid alkaline oily liquid, and nicotianin, a bitter aromatic lamellar substance, are both derived from tobacco in all its parts, and are therapeutic agents.

Niemeyera prunifera, F. von Mueller. (*Lucuma prunifera,* Bentham.)

The Australian Cainito. An evergreen tree, sparingly dispersed from the north of New South Wales through the coast forests of Queensland. The fruit is of a plum-like appearance and edible. Culture is likely to improve its quality.

Nuphar multisepalum, Engelmann.

Western North America. This Water Lily produces nutritious seeds, which taste like Broom Corn and are used locally for food, but are more particularly valuable for waterfowl. Various species of *Nymphæa* might be utilised in the same manner, irrespective of their value as decorative lake or pond plants.

Nyctanthes arbortristis, Linné.

India, up to Assam. This arborescent shrub may be grown in any moist regions free of frost, for the exquisite fragrance of its flowers, from which essence of jasmin can be obtained.

Nyssa aquatica, Linné.

North America. The Tupelo. This large deciduous tree can be reared in pools and deep swamps, and is thus well adapted for aquatic scenery. The spongy roots of this species serve as a substitute for cork and the floats of nets.

Nyssa multiflora, Wangenheim.

Eastern States of North America, where it is called the Forest Tupelo or Black Gum Tree (Dr. Asa Gray); also called Sour Gum Tree. Attains a height of 50 feet. Suited for forest soil; has horizontal branches and a "light, flat spray, like the Beech." Can be propagated from cuttings. The wood is very hard, but light and almost unwedgeable; it serves for hubs of wheels, pumps, sideboards of carts, trays, bowls, dippers, mortars, wooden shoes, hatters' blocks, and various turners' work. The foliage turns bright crimson in autumn. The fruits are pleasantly acidulous like those of N. capitata (Walter) and of some other species, and often used for preserves.

Nyssa uniflora, Walter.

Eastern States of North America. The Swamp Tupelo. Wood soft, that of the roots very light and spongy, thus used for corks (Dr. Asa Gray). Attains a height of 8 feet. The mucilaginous fruits are edible.

Ocimum Basilicum, Linné.

The Basil. Warmer parts of Asia and Africa. An annual herb, valuable for condiments and perfumery. Several varieties exist, differing considerably in their scent. A crystalline substance is also obtained from this and similar species. O. canum (Sims) is closely allied.

Ocimum gratissimum, Linné.

Recorded from India, the South Sea Islands, and Brazil, as indigenous. Somewhat shrubby. This is also a scent plant like the following, and is one of the best of the genus. O. viride (Willd.) from tropical Africa seems a variety.

Ocimum sanctum, Linné.

Arabia, India, tropical Australia. A perennial herb. The odour of the variety occurring in North Australia reminds of anise; the smell of the variety growing in East Australia resembles cloves. O. tenuiflorum, L., seems to be another variety. Probably other species, cis- as well as trans-Atlantic, can be used like Basil.

Ocimum suave, Wildenow.

East Africa. A scrubby species.

Olea Europæa, Linné.*

The Olive Tree. From South-Western Asia; naturalised in the countries around the Mediterranean Sea. A tree not of great height, but of many centuries' duration and of unabating fecundity. The well-known olive oil is obtained from the fruit. Certain varieties of the fruit, preserved in vinegar or salt-liquid before perfectly ripe, are also much used for the table. For this purpose the fruit is generally macerated previously in water containing potash and lime. The gum-resin of the Olive Tree contains the crystalline olivil. The oil of the drupaceous fruit is a most important product of countries with a temperate climate. Its chemical constituents are: 30 per cent. crystalline palmitin; 70 per cent. olein, through which olive oil belongs to those kinds which are not drying. In pressing, the kernels must not be crushed, as then a disagreeable taste will be imparted to the oil. The wild variety of the olive tree has usually short blunt leaves and thorny branches. Long-continued droughts, so detrimental to most plants, will affect the olive but slightly. It thrives best on a free, loamy, calcareous soil, even should it be strong and sandy, but it dislikes stiff clay. Proximity

to the sea is favourable to it, and hill-sides are more eligible for its culture than plains. The ground must be deeply trenched. Manuring with well-decayed substances is requisite annually, or every second or third year, according to circumstances. Irrigation will add to the productiveness of the plant. Mons. Riordet distinguishes three main varieties, of which he recommends two: 1, The Cayon, a small-sized tree, which comes into bearing after three or four years, but it bears fully only every second year; its oil is fine with some aroma. 2, The Pendulier, a larger tree, with long drooping branches, yielding an oil of first-rate quality. Mons. Reynaud, "Culture de l'Oliver," separates twelve varieties, as cultivated in France, and recommends among them: 1, The Courniau or Courniale, also called Plante de Salon, bearing most prolifically a small fruit and producing an excellent oil. 2, The Picholine, which by pruning its top branches is led to spread over eight yards square or more. It is of weeping habit, yields a good oil in fair quantity, and resists well the attacks of insects. 3, The Mouraou or Mourette, a large tree also furnishing oil of a very fine quality. Olive trees require judicious pruning immediately after the fruit is gathered, when the sap is comparatively at rest. They may be multiplied from seeds, cuttings, layers, suckers, truncheons, or estacas and old stumps, the latter to be split. They can also be propagated from protuberances at the base of the stem, which can be sent long distances (Boothby). The germination of the seeds is promoted by soaking the nutlets in a solution of lime and wood ash. The seedlings can be budded or grafted after a few years. Truncheons or estacas may be from one to many feet long and from one inch to many inches thick; they are placed horizontally into the ground. Olive plantations at Grasse are worth from £200 to £250 per acre. For many details the tract on the "Culture of Olive and its Utilisation," issued in Melbourne by the Rev. Dr. Bleasdale, should be consulted, as it rests largely on its author's observations during a long stay in Portugal. Also the essay of Mr. S. Davenport in Adelaide.

The following notes are derived from the important "Tratado del Cultivo del Olivo en Espana," by the Chev. Capt. Jose de Hidalgo-Tablada (second edition, Madrid, 1870). The Olive Tree will resist for a short time considerable frost (—15° C.), provided that the thawing takes place under fogs or mild rain (or perhaps under a dense smoke). It requires for ripening its fruit about one-third more annual warmth than the vine. The Olive zones of South Europe and North Africa are between 18° and 44° north latitude. An elevation of about 550 feet

corresponds in Spain, as far as this culture is concerned, to one degree further north. Olives do not grow well on granite soil. The fruit produced on limestone formations is of the best quality. Gypsum promotes the growth of the tree. An equable temperature serves best; thus exposure to prevailing strong winds is to be avoided. The winter temperature should not fall below $-7°$ C. The quantity of oil in the fruit varies from 10 to 20 per cent.; sometimes it even exceeds the latter proportion. In Provence at an average 24 lbs. of olive oil are consumed by each individual of the population annually in Andalusia about 30 lbs. For obtaining the largest quantity of oil the fruit must be completely ripe. Hand-picked olives give the purest oil. Knocking the fruit from the branches with sticks injures the tree and lessens its productiveness in the next year. Spain alone produces about 250,000,000 lbs. of olive oil a year.

SPANISH VARIETIES.

-Varieties of early maturation, for colder localities:—

1. Var. *pomiformis*, Clem.
Manzanillo. (French: Ampoulleau.) Fruit above an inch in diameter, spherical, shining black. Putamen broad and truncate.
2. Var. *regalis*, Clem.
Sevillano. (French: Pruneau de Catignac.) Fruit about an inch in diameter, ovate-spherical, blunt, bluish black.
3. Var. *Bellotudo* or *Villotuda*.
Fruit about an inch long, egg-shaped; pericarp outside dark red, inside violet.
4. Var. *Redondillo*.
Fruit ovate-spherical, nearly an inch long. Pericarp outside bluish black, inside whitish. A rich yielder.
5. Var. *ovalis*, Clem.
Lechin, Picholin, Acquillo. (French: Saurine.) Fruit broad-oval, two-thirds of an inch long. A copious yielder.
6. Var. *argentata*, Clem.
Nevadillo blanco; Doncel; Zorzalena; Moradillo; Ojiblanco; Olivo lucio. Fruit broad-ovate, an inch long, very blunt, not oblique. Quality and quantity of oil excellent.
7. Var. *Varal blanco*.
(French: Blanquette.) Fruit ovate, globular, three-fourths of an inch long, neither pointed nor oblique, outside blackish red.
8. Var. *Empeltre*.
Fruit ovate, an inch long, equable. Rich in oil of excellent quality, also one of the best for pickles. Pericarp outside violet, inside white.

9. Var. *Racimal.*
(French: Bouteillan, Boutiniene, Ribien, Rapugette.) Fruit violet coloured, globose-ovate, about an inch long; neither pointed nor oblique. Bears regularly also on less fertile soil, and is one of the earliest to ripen.

10. Var. *Varal negro.*
Alameno. (French: Cayon, Nasies.) Fruit violet-black, spotted, globose-ovate, nearly an inch long, somewhat pointed. Bears richly.

11. Var. *Colchonuda.*
Fruit spheric, outside red, inside white, one inch in diameter, slightly pointed. Produces a large quantity of good oil.

12. Var. *Ojillo de Liebre.*
Ojo de Libre. Fruit nearly spherical, outside violet-black, about one inch long, somewhat oblique. One of the less early varieties.

13. Var. *Carrasquena.*
(French: Redouan de Cotignat.) Fruit black-red, almost spherical, slightly oblique, about an inch long. Valuable both for oil and preserves, but liable to be attacked by various insects.

14. Var. *Hispalensis*, Clem.
Gordal; Ocal; Olivo real. Fruit black-grey, oblique, spherical, measuring fully an inch. Rather a large and quick-growing tree. Fruit used in the green state for preserves, not used for table oil.

15. Var. *Verdego.*
Verdial. (French: Verdal, Verdan.) Fruit black-violet, oblique-spheric, pointed, about one inch long. Furnishes good oil, and resists the cold best of all.

B.—Varieties of late maturation, for warmer localities:—

16. Var. *maxima*, Clem.
Madrileno; Olivo moreal. Fruit over an inch long, cordate-globose, strongly pointed. Less valuable for oil than for preserves.

17. Var. *rostrata*, Clem.
Cornicabra. (French: Cournaud, Corniaud, Courgnale, Pl. de Solon, Pl. de la Fane; Cayon Rapunier, Grasse.) Strong and tall, less tender. Fruit blackish-red, over an inch long, oval, much pointed, Good for oil.

18. Var. *ceratocarpa*, Clem.
Cornezuelo. (French: Odorant, Luquoise, Luques.) Fruit fully an inch long, oval, pointed.

19. Var. *Javaluno.*
Fruit black-grey, over an inch long, egg-shaped, somewhat

oblique, gradually pointed. Rich in good oil; can also be chosen for preserves; much subject to attacks of insects.

20. Var. *Picudo.*
Fetudilla. Fruit fully an inch long, egg-shaped, blunt at the base, pointed at the apex, with black-grey pulp. Pericarp easily separable. Employed both for oil and preserves.

21. Var. *Nevadillo negro.*
Fruit egg-shaped, fully an inch long, with turned pointed apex. One of the richest of all varieties in yield. Endures considerable cold and ripens not quite late.

All these Spanish varieties show rather long, lanceolate leaves, of more or less width.

FRENCH VARIETIES.

(Some verging into the Spanish kinds.)

22. Var. *angulosa,* Gouan.
Galliningue, Laurine. For preserves.

23. Var. *Rouget.*
Marvailletta. Produces a fine oil.

24. Var. *atrorubens,* Gouan.
Salierne, Saverne. Fruit dusted white. Furnishes one of the best of oils.

25. Var. *variegata,* Gouan.
Marbée, Pigale, Pigau. Purple fruit, with white spots.

26. Var. *Le Palma.*
Oil very sweet, but not largely produced.

27. Var. *atrovirens,* Ros.
Pointue, Punchuda. Fruit large, with good oil.

28. Var. *rubicans,* Ros.
Rougette. Putamen small. Yield annual and large.

29. Var. *alba,* Ros.
Olive blanche, Blancane, Vierge. This, with many others omitted on this occasion, is an inferior variety.

30. Var. *Caillet rouge.*
Figanier. Small tree. Fruit large, red. Oil good and produced in quantity.

31. Var. *Caillet blanche.*
Fruit almost white, produced annually and copiously, yielding a rather superior oil.

32. Var. *Raymet.*
Fruit large, reddish. Oil copious and fine. This variety prefers flat country.

33. Var. *Cotignac.*
Pardignière. Fruit middle-sized, blunt. Oil obtained in quantity and of excellent quality. This wants much pruning.

9. Var. *Racimal.*
(French: Bouteillan, Boutiniene, Ribien, Rapugette.) Fruit violet coloured, globose-ovate, about an inch long; neither pointed nor oblique. Bears regularly also on less fertile soil, and is one of the earliest to ripen.

10. Var. *Varal negro.*
Alameno. (French: Cayon, Nasies.) Fr...
spotted, globose-ovate, nearly ...tes.
Bears richly.

11. Var. *Colchonud* ...n ascends there to 5,000 feet. The very
Fruit spher... ...ickly stem attains a height of 50 feet.
slightl...

12 ..ychis sativa, Lamarck.*

The Saintfoin, or Esparsette, or Cock's-head Plant. South and Middle Europe, Middle Asia. A deep-rooting perennial fodder herb, fond of marly soil, and living in dry localities. It is thus well adapted also for the limestone formation of the lower Murray River. It prepares dry calcareous soil also for cereal culture. Stagnant underground humidity is fatal to this plant. It prospers still where Red Clover and Lucerne no longer succeed. Sheep cannot be turned out so well on young Saintfein fields as cattle. The hay is superior even to that of Lucerne and Clover. The plant will hold out from five to seven years (Langethal).

Onosma Emodi, Bentham.

(Maharanga Emodi, A. deCandolle). Nepal. The root, like that of the Kanna tinctoria, produces a red dye.

Opuntia coccinellifera, Miller.

Mexico and West India. The Cochineal Cactus. On this and O. Tuna, O. Hernandezii, and perhaps a few others, subsists the Coccus, which offers the costly cochineal dye. Three gatherings can be effected in the year. About 1,200 tons used to be imported annually into Britain alone, and a good deal also to other countries, valued at about £400 for the ton. The precious carmin pigment is prepared from cochineal. Different Cochineal Opuntias occur also in Argentina. Some species of Opuntia will endure a temperature of 14° F. One even advanced to 50° north latitude in Canada. Mr. Dickinson, of Port Arlington, Victoria, observes that many species are hardy in his neighbourhood, growing even in sand, overtopping by 10 feet the Leptospermum lævigatum and breaking it down by their great weight within a few yards of the sea.

oblique, gradually pointed. Rich in good oil; can also be chosen for preserves; much subject to attacks of insects.

20. Var. *Picudo*.

Fetudilla. Fruit fully an inch long, egg-shaped, blunt at the base, pointed at the apex, with black-grey pulp. Pericarp [illegible]sily separable. Employed both for oil and preserves.

Opunt[illegible]

[illegible]adillo negro.

Central America. [illegible] inch long, with turned pointed [illegible]rieties in yield. Endures

Opuntia Ficus Indica, Miller.

Called inaptly, with other congeners, Ind[illegible] America, north as far as Florida. Serves for [illegible]colate leaves, of fruit edible.

Opuntia Hernandezii, Candolle.

Mexico. Affords also food for the Coccus Cacti.

Opuntia Missouriensis, Candolle.

From Nebraska to New Mexico. Professor Meehan found this Cactus covered with the Cochineal Coccus, and points to the fact that this insect will live through the intense cold which characterises the rocky mountains of the Colorado regions.

Opuntia Rafinesquii, Engelmann.

North America. The most northern of all species, extending to Lake Michigan.

Opuntia spinosissima, Miller.

Mexico and West India. Stem columnar with pendant branches. Also a good hedge plant. Harding recommends for hedges, besides these species, O. maxima, Miller, as the most repellent.

Opuntia Tuna, Miller.

West India, Ecuador, New Granada, Mexico. Irrespective of its value as the principal cochineal plant, this Cactus is also of use for hedges. It will attain a height of 20 feet. The pulp of the fruit is edible. With the other species hardy on the south coast of Australia.

Opuntia vulgaris, Miller.

Central America, northward to Georgia, southward to Peru. Adapted for hedges, and, like the rest, not inflammable, thus particularly valuable along railway lines. The fruit almost

smooth, also eatable. A dye can also be prepared from its pulp and that of allied species. Numerous other species are industrially eligible for hedging purposes.

Oreodoxa frigida, Humboldt.

Central America, ascending the Andes to 8,500 feet. This dwarf slender Palm may be chosen for domestic decorations.

Oreodoxa regia, Humboldt.

West India. This noble Palm attains a height of 60 feet. It has proved hardy in Southern Brazil. The stem is thickened at the middle, and from it, like from the much taller O. oleracea (Martius), starch can be obtained.

Origanum Dictamnus, Linné.

Candia. Like the following, a scent plant of somewhat shrubby growth.

Origanum Majorana, Linné.

North Africa, Middle Asia, Arabia. A perennial herb, used for condiments, also for the distillation of its essential oil.

Origanum Maru, Linné.

Palestine. Perennial and very odorous.

Origanum Onites, Linné.

Countries near the Mediterranean Sea. Somewhat shrubby and strongly scented.

Origanum vulgare, Linné.

The ordinary Marjoram. All Europe, North Africa, North and Middle Asia. A scented herb of perennial growth, containing a peculiar volatile oil. It prefers limestone soil. O. hirtum (Link.), O. virens (Hoffmannsegg), and O. normale (D. Don) are closely allied plants of similar use. Several other Marjorams, chiefly Mediterranean, are of value.

Ornithopus sativus, Brotero.

South Europe and North Africa. The Seratella or Serradella. An annual herb, larger than the ordinary Bird's-foot Clover. It is valuable as a fodder plant on sterile soil. It requires, like the smaller O. perpusillus, no lime, but improves in growth on gypsum land. It thrives better on sandy soil than on lime soil, according to Langethal.

Oryza latifolia, Humboldt and Bonplaud.

Central America. This species is said to be perennial and to attain a height of 18 feet. It deserves trial culture, and may prove a good fodder grass on wet land in warm localities. O. perennis (Moench) seems closely allied.

Oryza sativa, Linné.*

The Rice Plant. South Asia and North Australia. Annual like most cereals. The many rivulets in our ranges afford ample opportunities for irrigating rice-fields; but these can be formed with full advantage only in the warmer parts of the colony, where rice will ripen as well as in Italy, China, or the Southern States of the American Union. Among the numerous varieties of Indian rice may be noted as prominent sorts: The Early Rice, which ripens in four months and is not injured by saline inundations. The hardier Mountain Rice, which can be raised on comparatively dry ground, and which actually perishes under lengthened inundation, but which is less productive. The Glutinous Rice, which succeeds as well in wet as in almost dry places, and produces black or reddish grains. In the rich plains of Lombardy, irrigated from the Alps, the average crop is estimated at 48 bushels for the acre annually. According to General Capron the average yield in Japan is 50 bushels per acre. The spirit distilled from rice and molasses is known as arrack. (These notes were written for the colony of Victoria.)

Osmanthus fragans, Loureiro.

China and Japan. The flowers of this bush serve for oil distillation like those of the Jasmine. The scent of one plant will perfume a whole conservatory (G. W. Johnson).

Osmitopsis asteriscoides, Cassini.

South Africa. A camphor-scented shrub, much in use there for medicinal purposes (Dr. Pappe).

Ostrya carpinifolia, Scopoli.

South Europe and Orient. The Hop Hornbeam. A deciduous tree, 60 feet high.

Ostrya Virginica, Willdenow.

Lever-wood Tree of North America, also called Iron-wood, 40 feet high, in rich woodlands. Wood singularly hard, close-grained, and heavy, in use for levers, mallets, wedges, and

other implements, for mill-cogs, wheels, etc. Cattle browse on the foliage. The growth of the tree is very slow.

Oxalis crassicaulis, Zuccarini.

Peru. This seems one of the best of those Wood Sorrels which yield a tuberous edible root. Amongst others, O. tuberosa (Mol.) and O. succulenta (Barn.) from Chili, as well as O. carnosa (Mol.) and O. conorrhiza (Jacq.) from Paraguay, might be tried for their tubers.

Oxalis esculenta, Otto and Dietrich.

Spurious Aracacha. Mexico, there with O. tetraphylla (Cavanilles), O. Deppei (Loddiges), O. violacea (Linné), and several others, producing tuberous, starchy, wholesome roots; the first mentioned gives the largest yield. Propagated by subdivision of the root stock. It requires a deep, rich, moist soil. As similarly useful may be mentioned among many others, O. crenata (Jacquin) from Chili and O. enneaphylla (Cavanilles) from the Falkland Islands and Magelhaen's Straits.

Oxytenanthera Thwaitesii, Munro.

Ceylon, on mountains from 4,000 to 6,000 feet high. A dwarf but handsome Bamboo, reaching only a height of 12 feet.

Oxytropis pilosa, Candolle. (*Astragalus pilosus*, Linné.)

Europe, West Asia. This perennial plant furnishes fair pasture herbage; it is deep-rooted, content with almost absolute sand; the numerous other species—twenty-four alone enumerated as Oriental by Boissier—should be tested. All these plants might be classed as Astragals. They are mostly content with poor soil.

Pachyma Cocos, Fries.

North America and East Asia. The hard Tuckahoe Truffle.

Pachyma Hœlen, Fries.

China. This large Truffle occurs particularly in the province of Souchong. Flavour most agreeable.

Pachyrrhizus angulatus, Richard.

From Central America, rendered spontaneous in many tropical countries. A climber, the horizontal starchy roots of which attain a length of 8 feet and a thickness of many inches. It

requires rich soil. The root is edible, though inferior to Yam. From the stems a tough fibre is obtained. The plant proved hardy at Sydney.

Paliurus ramosissimus, Poiret. (*P. Aubletia,* Schultes.)

China and Japan. A thorny tree, which could be utilised for hedging.

Paliurus Spina Christi, Miller. (*P. aculeatus,* Lambert.)

The Christ Thorn. From the Mediterranean Sea to Nepaul. A deciduous bush or finally tree, which can be trimmed into hedges.

Pandanus furcatus, Roxburgh.

This Screw Pine occurs in India, up to heights of 4,000 feet, according to Mr. S. Kurz ; hence it will likely bear a temperate clime, and give us a stately plant for scenic group-planting. P. pedunculatus (R. Br.) occurs in East Australia as far south as 32°, and an allied tall species (*P. Forsteri,* Moore and Mueller) luxuriates in Howe's Island.

Panicum altissimum, Meyer.

P. elatius, Kunth. From Mexico to Brazil. An almost woody species of arborescent habit, attaining a height of 30 feet. Panicles up to a foot and a half long. Evidently desirable for naturalisation.

Panicum amarum, Elliot.

North America. A perennial species, fit to be grown on drifting coast sand.

Panicum, barbinode, Trinius.

Brazil. Valuable as a fodder grass.

Panicum brizanthum, Hochstetter.

From Abyssinia to Nepal. A large-grained perennial Millet Grass.

Panicum compositum, Linné.

South Asia, East Australia, Polynesia, New Zealand. The growth of this soft-bladed and prolific grass should be encouraged in forest ground.

Panicum Crus Galli, Linné.

The Barnyard or Cockshin Grass. Occurring now in all warm countries, but probably of Oriental origin, as it seems not recorded in our ancient classic literature. A rich but annual grass of ready spontaneous dispersion, particularly along sandy river banks, also around stagnant water. P. colonum, L., and P. Crus Corvi, L., are varieties of it. Regarded by R. Brown as indigenous in Eastern and Northern Australia, where many other excellent fodder species occur, some perennial. It will succeed also on somewhat saline soil, particularly on brackish watercourses, also in moor land.

Panicum decompositum, R. Brown. (*P. lævinode*, Lindley.)

The Australian Millet. One of the most spacious of Australian nutritious grasses. The aborigines convert the small millet-like grains into cakes. This grass will thrive on poor soil. Hardly different from the North American P. capillare, L., except in perennial roots. Of similar value the exclusively Australian P. effusum, R. Br.

Panicum divaricatissimum, R. Brown.

Australia, particularly in the warmer inland regions. A good perennial grass, of easy growth on poor soil.

Panicum divaricatum, Linné.

P. bambusoides, Hamilton. Central and South America. A grass of a scandent habit, ascending high up in trees; desirable for naturalisation in forests.

Panicum flavidum, Retzius.

South Asia, tropical and Eastern sub-tropical Australia. According to Mr. Bailey a prolific seed-bearer, mostly prostrated by the weight of the seeds.

Panicum fluitans, Retzius.

Tropical Asia and Africa. This perennial grass, like P. spinescens (R. Brown), of East Australia, ought to be naturalised along lakes, lagoons, and rivers, particularly for the benefit of waterfowl.

Panicum foliosum, R. Brown.

India, East Australia. Perennial. Mr. Bailey finds this to be one of the best grasses for river banks.

Panicum frumentaceum, Roxburgh.

The Shamalo or Deccan Grass. Probably introduced from tropical Africa into South Asia. It serves as a fodder grass and produces also a kind of millet. The grain much recommended by Mr. C. B. Taylor for culinary purposes. To this species is allied P. sarmentosum, Roxb., from Sumatra, which is now likewise much cultivated in tropical countries. It is perennial.

Panicum Italicum, Linné.

This grass, notwithstanding its specific name, is of Indian origin, ascending the Himalayas to 6,500 feet. It is annual and worthy to be cultivated as a tender green fodder, attaining a height of 5 feet. It keeps weeds down. The abundantly-produced grain is not only one of the best for poultry, but that of some varieties can also be utilised as millet. Considered by many a delicious grain for cakes and porridge. The Brahmins hold it in higher esteem than any other grain (Dr. Ainslie). P. Germanicum, Roth., is a form of this species. The similar P. macrostachyum, Nees, occurs in many tropical regions.

Panicum Koenigii, Sprengel (*P. Helopus,* Trin.)

India. A good fodder grass.

Panicum latissimum, Mikan.

Brazil. A highly ornamental grass. Leaves extremely broad, but hard; panicle very rich.

Panicum maximum, Jacquin.* (*P. jumentorum,* Persoon.)

The Guinea Grass. Tropical Africa; elsewhere not indigenous. This perennial grass attains a height of 8 feet in tropical countries. It is highly nutritious and quite adapted for the warmer temperate zone, hardy as far south as Buenos Ayres. A favourite grass in tropical countries for stall fodder. Succeeds even on poor clay soil and on sea-sand.

Panicum miliaceum, Linné.* (*P. miliare,* Lam.)

The true Millet. South Asia, ascending the Himalayas to 11,000 feet, North Australia, but cultivated in Southern Europe so early as Hippocrates' and Theophrastos' time. Annual, attaining a height of 4 feet. Several varieties occur, one with black grains. They all need a rich but friable soil. It is one of the best of all grains for poultry, but furnishes also a palatable and nutritious table food. It ripens still in Middle Europe.

Panicum molle, Swartz.*

P. sarmentosum, Roxburgh. Warmer parts of America, Africa, and Asia. The Para Grass. A perennial, very fattening pasture grass, of luxuriant growth, attaining a height of 6 feet (Grisebach). It is hardy at the Cape of Good Hope.

Panicum Myurus, Lamarck.

Tropical Asia and America, North-East Australia. A perennial aquatic grass, with broad-bladed foliage, fit for ditches and swamps. Regarded as very palatable and nutritious to stock by Mr. Bailey.

Panicum obtusum, Humboldt.*

The Mosquito or Mezquite Grass of Mexico. Perennial; nutritious.

Panicum parviflorum, R. Brown.

East Australia. On dry hills; a fine pasture grass, while P. bicolor and P. marginatum (R. Br.) are likewise enumerated by Mr. Bailey among the nutritious grasses of East Australia.

Panicum pilosum, Swartz.

Tropical America. A perennial fodder grass.

Panicum prolutum, F. v. Mueller.

South-East Australia. Flourishes in the hottest weather; bears a large panicle of seed.

Panicum prostratum, Lamark. (*P. setigerum,* Retz.)

Egypt, South Asia, North Australia, perhaps also indigenous to tropical America. Perennial. Recommendable for pastures.

Panicum pygmæum, R. Brown.

East Australia. Forms a soft, thick, carpet-like verdure in forest shade (Bailey).

Panicum repens, Linné.

On the Mediterranean Sea, also in South Asia and North Australia. Regarded by the Cingalese as a good fodder grass. It is perennial and well suited for naturalisation on moist soil or river banks or swamps.

Panicum sanguinale, Linné.

From South Europe and Southern Asia, spread through all countries with a warm climate, but apparently also indigenous in East Australia. It readily disseminates itself on barren ground, and is likely to add to the value of desert pastures, although it is annual. Stock relish this grass. P. ciliare (L.) and P. glabrum (Gaudin) are allied species.

Panicum semialatum, R. Brown.

Warmer regions of Asia, Africa, and Australia. A superior tall pasture-grass, of easy dispersion in warm, humid localities.

Panicum spectabile, Nees.*

The Coapim of Angola. From West Africa, transferred to many other tropical countries. A rather succulent, very fattening grass, attaining a height of about 4 feet. It may be assumed that hitherto about 300 well-defined species of Panicum are known, chiefly tropical and sub-tropical, thus very few extending naturally to Europe, or the United States of North America, or Japan, or the southern part of Australia. Though mostly from the hot zones, these grasses endure in many instances a cooler clime, and some of them would prove great acquisitions, particularly the perennial species. Numerous good kinds occur in Queensland and North Australia spontaneously. Panicum is the genus richest in species among grasses.

Panicum terniflorum, R. Brown. (*Paspalum brevifolium,* Fluegge.)

South Asia and East Australia. It has a running stem and forms a good bottom as a pasture grass (Bailey).

Panicum turgidum, Forskael.

Egypt, where this Millet yields a bread grain.

Panicum virgatum, Linné.

North America, South Asia, and North Australia. A tall perennial species, with a wide, nutritious panicle.

Papaver somniferum, Linné.

The Opium Poppy. Orient. The capsules of this tall annual, so showy for its flowers, are used for medicinal purposes; from the minute but exceedingly numerous seeds oil of a harmless and most palatable kind can be pressed remuneratively; but

a still more important use of the plant is that for the preparation of opium. Both the black and pale seeded varieties can be used for the production of opium. The return of poppy culture, whether for opium or for oil, is within a few months. Milder and somewhat humid open forest tracts proved most productive for obtaining opium from this plant; but it can be reared also in colder localities, good opium, rich in morphia, having even been obtained in Middle Europe and the Northern United States, the summers there being sufficiently long to ripen the poppy with a well-elaborated sap. The morphia contents in opium from Gippsland were at an average somewhat over 10 per cent. Opium was prepared in the Melbourne Botanic Gardens for the Exhibition of 1866; but particularly Mr. J. Bosisto and Mr. J. Hood have given to this branch of rural industry there commercial dimensions. The Smyrna variety is particularly desirable for opium; it enables the cultivator to get from 40 lbs. to 75 lbs. of opium from an acre, generally worth 30s. to 35s. per pound. The ground for poppy culture must be naturally rich, or otherwise be well manured; dressing with ashes increases the fecundity of the plant. The seed, about 9 lbs. to an acre, is generally sown broadcast, mixed with sand. In the most favourable places as many as three crops are obtained during a season. The collecting of the opium, which consists merely of the indurating sap of the seed-vessels, is commenced a few days after the lapse of the petals. Superficial horizontal or diagonal incisions are made into the capsules as they successively advance to maturity. This operation is best performed in the afternoons and evenings, and requires no laborious toil. The milky opium sap thus directed outwards, is scraped off next morning into a shallow cup, and allowed to dry on a place away from sunlight; it may also be placed on poppy leaves. From one to six successive incisions are made to exhaust the sap, according to season, particular locality, or the knife-like instrument employed. In the Department of Somme (France) alone opium to the value of £70,000 annually is produced, and poppy seed to the value of £170,000. Australian seasons, as a rule, are favourable for collecting opium, and thus this culture is here rendered less precarious than in many other countries. Our opium has proved as good as the best Smyrna kinds. The petals are dried for packing the opium. The main value of opium depends on its contents of morphia, for which the genus Papaver, as far as hitherto known, remains the sole source. But not less than fourteen alkaloids have been revealed in opium by the progressive strides of organic chemistry: Codein, metamorphin, morphia or morphin,

narcein, narcotin, opianin, papaverin, porphyroxin, xanthopin, meconidin, codamin, laudanin, pseudo-morphin, and thebain. In contains, besides, an indifferent bitter principle: meconin and meconic acid (*vide* "Wittstein's Chemische Analyse von Pflanzentheilen," my edit., p. 163). Various species of Papaver produce more or less opium and morphia.

Pappea Capensis, Ecklon and Zeyher.

South Africa. The fruit of this tree is of the size of a cherry, savoury and edible.

Pappophorum commune, F. v. Mueller.

Widely dispersed over the continent of Australia, also in some parts of Asia and Africa. Perennial; regarded as a very fattening pasture grass, and available for arid localities.

Parinarium Nonda, F. v. Mueller.

The Nonda Tree of North-East Australia. It may prove hardy in temperate climes, and may live perhaps in the dry and hot air of deserts, where it deserves trial culture for the sake of its edible, mealy, plum-like fruit. A few other species with esculent drupes occur in different tropical countries.

Parkinsonia aculeata, Linné.

From California to Monte Video. A thorny shrub, clearly adapted for the warmer temperate zone, where it might be utilised with the following plant for evergreen hedges. The flowers are handsome.

Parkinsonia Africana, Sonder.

South Africa. A tall bush. A third species, P. microphylla, Torr., occurs on the Colorado.

Parrotia Jacquemontiana, Decaisne,

North-Western Himalayas, from about 3,000 to 8,500 feet elevation. This deciduous-leaved small tree merits attention. Its tough and pliable twigs are used for basket-work and preferentially for the twig bridges, the latter up to 300 feet long; hence this tree could be used for a variety of economic purposes (Stewart and Brandis). P. Persica (C. A. Meyer) occurs on the Caspian Sea.

Parthenium integrifolium, Linné.

North America. The flowering tops of this perennial bitter herb have come into use as a febrifuge (Houlton).

Paspalum ciliatum, Humboldt.

Tropical South America. A perennial and lauded cereal grass.

Paspalum dilatatum, Poiret.

Extra-tropical South America. Perennial, of excellent quality for fodder. Mr. Bacchus found it hardy in Victoria up to a height of 2,000 feet. It grew in New South Wales after drought was followed by heavy rains 4½ feet in little more than two months. It is closely allied to the Mexican P. virgatum, L. Introduced into Australia like many other fodder grasses by the writer.

Paspalum distichum, Burmann.

From India to South-Eastern Australia. The Silt Grass. A creeping swamp-grass, forming extensive cushions. It keeps beautifully green throughout the year, affords a sufficiently tender blade for feed, and is exquisitely adapted to cover silt or bare slopes on banks of ponds or rivers, where it grows grandly; moderate submersion does not destroy it, but frost injures it; it thrives well also on salt marshes.

Paspalum notatum, Fluegge.*

Brazil and Argentina. This is one of the best of fodder grasses there, forming a dense, soft, carpet-like sward on meadows, and becoming particularly luxuriant and nutritious on somewhat saline soil (Lorentz).

Paspalum scrobiculatum, Linné.

Through the tropics of the eastern hemisphere widely dispersed, extending to South-East Australia. A valuable pasture grass. A superior variety is cultivated in India for a grain crop. This grass furnishes a good ingredient to hay. The stem sometimes attains a height of 8 feet. Rosenthal pronounces it pernicious, perhaps when long and exclusive use is made of this grass, under which circumstances the Rye Grass will also become injurious.

Paspalum stoloniferum, Bosc.

Central America. A fodder grass of considerable value.

Passiflora alata, Aiton.

Peru and Brazil. This Passion Flower and all the following (and probably other species) furnish Granadilla fruits.

Passiflora coccinea, Aublet.
From Guiana to Brazil.

Passiflora cœrulea, Linné.
South Brazil and Uruguay. One of the hardiest of all Passion Flowers, and with many others well adapted for covering bowers, rookeries, and similar structures. Many of the equatorial species come from mountainous regions and may thus endure temperate clime.

Passiflora edulis, Sims.
Southern Brazil.

Passiflora filamentosa, Willdenow.
Southern Brazil.

Passiflora incarnata, Linné.
North America from Virginia and Kentucky southward. The fruits are called May Pops.

Passiflora laurifolia, Linné. (*P. tinifolia,* Jussieu.)
The Water Lemon. From West India to Brazil.

Passiflora ligularis, Jussieu.
From Mexico to Bolivia. Professor Ernst of Caracas says that its fruit is one of the finest anywhere in existence.

Passiflora lutea, Linné.
North America from Pennsylvania and Illinois southward. Berries small.

Passiflora macrocarpa, Masters.
Brazil and Peru. Mr. Walter Hill reports having obtained fruits of 8 pounds weight at the Brisbane Botanic Garden.

Passiflora maliformis, Linné.
From West India to Brazil.

Passiflora quadrangularis, Linné.
Brazil. One of the most commonly cultivated Granadillas.

Passiflora serrata, Linné.
From West India to Brazil.

Passiflora suberosa, Linné. (*P. pallida,* Linné.)

From Florida to Brazil. A careful investigator, Dr. Maxw. Masters, has recently defined about 200 species of Passion Flowers.

Paullinia sorbilis, Martius.

Brazil. A climbing shrub, possibly hardy in the warm temperate zones, where many tropical Cupaniæ and other sapindaceous trees endure the clime. The hard Guarana paste of chocolate colour is prepared from the seeds by trituration in a heated mortar with admixture of a little water, kneaded into a dough and then dried. This paste, very rich in coffein, serves for a pleasant beverage and also medicinally.

Paulownia imperialis, Siebold.

Japan. A tree, hardier than Cercis Siliquastrum, of value for scenic effects.

Peireskia aculeata, Miller.

West India. The Barbadoes Gooseberry. A tall shrub, adapted for hedges in localities free of frost. The cochineal insect can be reared on this plant also. The berries are edible. Several other species exist in tropical America, among which P. Bleo (Humb.) is particularly handsome, but they may not all be sufficiently hardy for utilitarian purposes in an extra-tropical clime. Otherwise the Bleo is used for salad.

Peireskia portulacifolia, Haworth.

West India. This attains the size of a fair tree.

Pelargonium odoratissimum, Aiton.

South Asia. A perennial trailing herb, from the leaves of which a fragrant oil can be distilled. Pelargonium oil is extensively produced in Algeria as a cheap substitute for attar of roses. The same remark applies to the shrubby P. radula and P. capitatum (Dr. Rosenthal). The Kaffirs assert that these plants keep off snakes.

Peltophorum Linnæi, Bentham. (*Cæsalpinia Brasiliensis,* Linné.)

A small tree, which provides the orange-coloured Brasiletto wood. This species likes dry calcareous soil (Grisebach). Endures the climate of Carolina.

Pennisetum thyphoideum, Richard.* (*Penicillaria spicata,* Willdenow ; *Panicum cæruleum,* Miller.)

Tropical Asia, Nubia, and Egypt. The Bajree. An annual,

ripening its millet crop in about three months in warm countries. The stems are thick and reach a height of 6 feet, the maximum length of a spike is about a foot and a half; Colonel Sykes saw exceptionally 15 spikes on one plant and occasionally 2,000 seeds in one spike. Together with Sorghum this is the principal cereal grown in India by the native races, except rice. This grass requires a rich and loose soil, and on such it will yield upwards of a hundred-fold. It furnishes also a good hay, and is also valuable as green fodder. Some of the many other species of Pennisetum are doubtless of value as pasture. A plant allied to P. thyphoideum occurs in China, namely, P. cereale (Trin.). This also affords millet or corn for cakes.

Pentzia virgata, Lessing.

South Africa. A small bush, recommended to be established in deserts for sheep fodder. It has the peculiarity that whenever a branch touches the ground, it strikes roots and forms a new plant; this enables the species to cover ground rapidly (Sir Samuel Wilson). Several other species occur in South Africa.

Periandra dulcis, Martius.

Sub-tropical Brazil. The sweet root yields liquorice.

Perilla arguta, Bentham.

Japan. An annual herb. An infusion of this plant is used to impart to table vegetables and other substances a deep-red colour. P. ocimoides (L.), of Upper India, serves probably similar purposes.

Persea gratissima, Gaertner.

From Mexico to Peru and Brazil in forest tracts near the coast. The Avocado Pear. Suggestively mentioned here as likely available for mild localities, inasmuch as it has become naturalised in Madeira, the Azores, and Canary Islands. A noble evergreen spreading tree. The pulp of the large pear-shaped fruit is of delicious taste and flavour. The fruit pulp contains about 8 per cent. of greenish oil.

Persea Teneriffæ, Poiret (*sub Lauro*). (*P. Indica,* Sprengel.)

Madeira, Azores, and Canary Islands. This magnificent tree produces a very beautiful, hard, mahogany-like wood, especially sought for superior furniture and turners' work. One of the most hardy trees of the large order of Laurinæ.

Peucedanum cachrydifolium, Ledebour.
Persia. A valuable fodder herb (Dr. Rosenthal).

Peucedanum graveolens, Bentham. (*Anethum graveolens,* Linné.)
The Dill. South Europe, North Africa, Orient. Annual. The well-known aromatic fruitlets used as a condiment. *P. Sowa,* Benth. (Anethum Sowa, Roxb.) is a closely-allied Indian annual herb.

Peucedanum officinale, Linné.
The Sulphur Root. Middle and South Europe, North Africa, Middle Asia. Perennial. The root is used in veterinary medicine. It contains, like that of the following species, the crystalline Peucedanian.

Peucedanum Ostruthium, Koch. (*Imperatoria Ostruthium,* Linné.)
Mountains of Middle Europe. A perennial herb, which could be grown in Alpine regions. The acid aromatic root is used in medicine, particularly in veterinary practice. It is required for the preparation of some kinds of Swiss cheese. P. Cervaria (Cuss.) and P. Oreoselinum (Moench) are also occasionally drawn into medicinal use.

Peucedanum sativum, Bentham. (*Pastinaca sativa,* Linné.)
The Parsnip. Europe, North and Middle Asia. Biennial. The root palatable and nutritious. A somewhat calcareous soil is favourable for the best development of this plant. The culture is that of the carrot; for fodder the root surpasses that of the latter in augmenting milk (Langethal).

Peucedanum Sekakul, Bentham.
Egypt and Syria. Biennial. The root is edible.

Peumus Boldus, Molina.
The Boldo of Chili. A small ornamental evergreen tree, with exceedingly hard wood, which is utilised for many kinds of implements. The bark furnishes dye material. The fruits are of aromatic and sweet taste (Dr. Philippi).

Peziza macropus, Persoon.
Europe. Mentioned by Goeppert among the edible mushrooms sold in Silesia, along with *P. repanda* (Whalenberg).

Phalaris aquatica, Linné.

South Europe and North Africa. Important as a perennial fodder grass, fit for wet ground.

Phalaris Canariensis, Linné.

The Canary Grass. An annual grass from the Canary Islands, now widely dispersed as a spontaneous plant over the warmer zones of the globe. Thus it has also become naturalised in Australia. It is grown for its seeds, which form one of the best kinds of fodder for many sorts of small cage-birds. The flour is utilised in certain processes of cotton manufacture, and liked for some kinds of cakes. The soil for the culture of the Canary Grass must be friable and not too poor. It is an exhaustive crop. As allied annual species of similar use, but mostly of less yield, may be enumerated: *P. brachystachys* (Link.) from Italy, *P. minor* (Retz) and *P. truncata* (Guss.) from various countries on the Mediterranean Sea. Other species, including some from Asia, are deserving of trial; but the perennial British *P. arundinacea* (L.) is too harsh to serve for wholesome fodder, nor does it furnish Canary seed.

Pharnaceum acidum, J. Hooker.

St. Helena. A dwarf perennial succulent plant, which might advantageously be naturalised on sea-shores, to yield an acid salad, perhaps superior to that of Portulaca oleracea.

Phaseolus aconitifolius, Jacquin.

India, up to 4,000 feet. A dwarf species. Dr. Forbes Watson admits it among the culinary beans of India. It will bear on arid soil. *P. trilobus* (Aiton) is a variety.

Phaseolus adenanthus, G. Meyer. (*P Truxillensis,* Humboldt; *P. rostratus,* Wallich.)

Almost cosmopolitan within the tropics, where irrespective of navigation and other traffic it becomes dispersed by migrating birds; truly spontaneous also in tropical Australia. A perennial herb with large flowers, resembling those of Vigna vexillata (Benth.). Cultivated for its seeds, which are rather small, but copiously produced. A variety with edible roots occurs.

Phaseolus coccineus, Kniphof.* (*P. multiflorus,* Willdenow.)

The Turkish Bean or Scarlet Runner. A native of the Orient, if Sprengel's identification is correct, according to

which this plant was known in Arabia and Persia in Avicenna's time; but according to other opinions it is a native of Mexico. A twining showy perennial, as useful as the ordinary French Bean. Its seeds usually larger than those of the latter plant, purple with black dots, but sometimes also pure blue and again quite white. The flowers occur sometimes white. The root contains a narcotic poison.

Phaseolus lunatus, Linné.

Considered as a native of tropical America, but also recorded as wild from many parts of tropical Africa and Asia. Biennial according to Roxburgh. Much cultivated in the warm zone for its edible beans, which are purple or white. A yellow-flowered variety or closely-allied species is known as the Madagascar Bean and proved hardy and productive in Victoria. *P. perennis*, Walt., from the United States of North America, is another allied plant.

Phaseolus Max, Linné. (*P. Mungo*, Linné; *P. radicatus*, Linné.)

The Green Gram. South Asia and tropical Australia. An annual very hairy plant, not much climbing. Frequently reared in India, when rice fails or where that crop cannot be produced. According to Sir Walter Elliot one of the most esteemed of Indian pulses. "It fetches the highest price and is more than any other in request among the richer classes, entering largely into delicate dishes and cakes." Cultivated up to 6,000 feet (Forbes Watson). Col. Sykes counted 62 pods on one plant with from 7 to 14 seeds in each. The seeds are but small, and the herb is not available for fodder. This plant requires no irrigation, and ripens in two and a half to three months. The grain tastes well and is esteemed wholesome. The harvest is about thirty-fold.

Phaseolus vulgaris, Linné.*

The ordinary Kidney Bean, or French Bean, or Haricot. India, from whence it came to Europe through the conquests of Alexander the Great; but apparently it is also wild in North-Western Australia. Though this common and important culinary annual is so well known, it has been deemed desirable to refer to it here with a view of reminding that the Kidney Bean is nearly twice as nutritive as wheat. The meal from beans might also find far-augmented use. As constituents of the beans should be mentioned a large proportion of starch (nearly half), then much legumin, also some phaseolin (which, like amygdalin, can be converted into an essential oil) and

inosit-sugar. Lentils contain more legumin but less starch, while Peas and Beans are in respect to the proportion of these two nourishing substances almost alike. The Kidney Bean can still be cultivated in cold latitudes and at Sub-Alpine elevations, if the uninterrupted summer warmth lasts for four months; otherwise it is more tender than the Pea. The soil should for field culture be friable and somewhat limy and not sandy. Phaseolus nanus, L. (the Dwarf-Bean), and P. tumidus, Savi (the Sugar-Bean, or Sword-Bean, or Egg-Bean), are varieties of P. vulgaris. Several other species of Phaseolus seem worthy of culinary culture. Haricot Beans contain very decided deobstruent properties, which, however, are generally destroyed by too much boiling. To obviate this they should be soaked for 24 hours in cold water to which salt has been added, and then gently boiled for not more than 30 or 40 minutes in very little water (Treas. Bot.).

Phleum pratense Linné.

The Catstail or Timothy Grass. Europe, North Africa, North and Middle Asia. One of the most valuable of all perennial fodder grasses. Its production of early spring herbage is superior to that of the Cock's-foot Grass. It should enter largely into any mixture of grasses for permanent pasturage. It will live also on moist and cold clay ground. This grass, and perhaps yet more the allied Phleum Alpinum, L., are deserving of an extensive transfer to moory mountain regions. For hay it requires mowing in a young stage. The seed is copiously yielded and well retained. The greatest advantage from this grass arises, according to Langethal, when it is grown along with clovers. It thrives even better on sandy meadows than on calcareous soil; it will prosper on poorer ground than Alopecurus pratensis; the latter furnishes its full yield only in the fourth year, whereas the Phleum does so in the second. The Timothy dries more quickly for hay and the seeds are gathered more easily, but it vegetates later, is of harder consistence, and yields less in the season after the first cut.

Phœnix dactylifera, Linné.*

The Date Palm. North Africa, also inland; Arabia, Persia. This noble Palm attains finally a height of 80, exceptionally 120, feet. It is unisexual and of longevity. "Trees of from 100 to 200 years old continue to produce their annual crop of

* These notes were written for the original Victorian edition.

dates," though gradually at very advancing age at diminished rates. Though from the sap sugar or palm wine can be obtained, and from the leaves hats, mats, and similar articles can be manufactured, we here would utilise this palm beyond scenic garden ornamentation only for its fruits. It is in the oases of our desert tracts, swept by burning winds, where the date palm would afford in time to come a real boon, although it might be grown also in the valleys of our mountains and in any part of our lowlands. Several bunches of flowers are formed in a season, each producing often as many as 200 dates. In Egypt as many as 4 cwt. of dates have been harvested in one season from a single date palm. Many varieties of Dates exist, differing in shape, size, and colour of the fruit; those of Gomera are large and contain no seed. The unexpanded flower bunches can be used for palm cabbage, the fibre of the leaf stalks for cordage. The town Elche in Spain is surrounded by a planted forest of about 80,000 date palms, and the sale of leaves for decorative purposes produces, irrespective of the value of the date fruits, a considerable income to the town; and so it is at Alicante. As far north as the Gulf of Genoa exists also a date forest. The ease with which this palm grows from seeds affords facility in adapted climes to imitate these examples, and we certainly ought to follow them in all parts of Australia, and in similar climes. The best dates are grown in oases, where fresh water gushes from the ground in abundance and spreads over light soil of the desert with its burning wind. The Zadie variety produces the heaviest crop, averaging 300 lbs. to the tree; superior varieties can only be continued from offshoots of the root; these will commence to bear in five years and be in full bearing in ten years; one male tree is considered sufficient for half a hundred females. The pollen-dust is sparingly applied by artificial means. The date palm will live in saltish soil, and the water for its irrigation may be slightly brackish.—(*Surgeon-Major Colvill.*) Northern limit of date about 35° north latitude.

Phœnix paludosa, Roxburgh.

India. A stout species, not very tall. Of value at least for decorative culture.

Phœnix pusilla, Gaertner.

India and South China. A dwarf species, likely also to be hardy. P. farinifera (Roxb.) appears to be identical. It is adapted for sandy and otherwise dry and barren land, but

prefers the vicinity of the sea. Berry shining black, with a sweet mealy pulp.

Phœnix reclinata, Jacquin.

South Africa, in the eastern districts. A hardy species, but not tall, often reclining. It is adapted for ornamentation. The sweet coating of the fruit is edible (Backhouse).

Phœnix silvestris, Roxburgh.

India, almost on any soil or in any situation. It has proved at Melbourne a very hardy species. Its greatest height is 40 feet. Berries yellowish or reddish, larger than in P. pusilla. Where this Palm abounds much sugar is obtained from it by evaporation of the sap, which flows from incisions into the upper part of the trunk—a process not sacrificing the plant, as for twenty years the sap can thus be withdrawn. A kind of arrack is obtained by fermentation and distillation of this sap, and also from the young spikes. Each plant furnishes the juice for about 8 lbs. of date sugar annually, but in some instances much more. About 50,000 tons of sugar are produced a year in Bengal alone from this and some other palms. The leaves are used for mats. It lives in drier regions than other Indian palms.

Phœnix spinosa, Thonning.

Tropical Africa, ascending mountain regions, thus perhaps hardy. Dr. Kirk found the green bushes, if immersed in water for half a day, suddenly to assume a scarlet hue, and then the astringent pulp to become edible and sweet.

Phormium tenax, J. R. and G. Forster.*

The Flax Lily of New Zealand, where it occurs as far south as 46° 30′, occurring also in the Chatham Islands and Norfolk Island, though not on Lord Howe's Island. It seems important that this valuable plant should be brought universally under culture, particularly on any inferior spare ground, or on the sea-beaches or any rocky declivity, where it may be left unprotected to itself, as no grazing animal will touch it. It is evident that the natural up-growth will soon be inedequate to the demand for the plant. It is adapted for staying bush fires when planted in hedgerows. Merely torn into shreds the leaves serve at once in gardens and vineyards as cordage, and for this purpose, irrespective of its showy aspect, the Phormium has been distributed from the Botanic Garden of Melbourne since the last twenty years. From the divided roots any

plantation can gradually be increased, or this can be done more extensively still by sowing the seeds. In all likelihood the plant would thrive and become naturalised in the Auckland and Campbell's Group, in Kerguelen's Land, the Falkland Islands, the Shetland Islands, and many continental places of both hemispheres. It proved hardy in England. Among the varieties three are better characterised than the rest: the Tebore, the Swamp, and the Hill variety. The first and the last mentioned produce a fibre fine and soft, yet strong, and the plants attain a height of only about 5 feet, whereas the Swamp variety grows to double that height, producing a larger yield of a coarser fibre, which is chiefly used for rope or paper making. As might be expected, the richer the soil, the more vigorous the growth of the plant; it likes, moreover, now and then to be overflown by fresh or brackish water, but it will not live if permanently sunk into wet. In swampy ground trenches should be dug to divert the surplus of humidity. Fibre, free from gum-resin, properly dressed, withstands moisture as well as the best Manilla rope. Carefully prepared, the fibre can also be spun into various textile durable fabrics, either by itself or mixed with cotton, wool, or flax. In October 1872, the sale of Phormium fibre in London was 11,500 bales, ranging in price from £19 to £31. The tow can also be converted into paper, distinguished for its strength and whiteness. The London price of Phormium fibre for this purpose is from £10 to £20 per ton.

For further details on the utilisation of this plant, the elaborate report of the New Zealand Commission for Phormium should be consulted. One of the dwarf varieties is Phormium Colensoi (J. Hooker).

Photinia eriobotrya, J. Hooker. (*Eriobotrya Japonica,* Lindley.)

China and Japan. The Loquat. This beautiful evergreen shrub or tree with its refreshing fruit is easily raised from seed, or superior varieties can, according to G. W. Johnson, be grafted also on the Whitethorn, or, better, still on the Quince. It is also a grand bush for scenic ornamental effects.

Phyllocladus rhomboidalis, Richard.

Celery Pine of Tasmania. A stately tree up to 60 feet high, with a stem of 2 to 6 feet in diameter. The timber is valuable for ships' masts. It will only grow to advantage in deep forest valleys.

Phyllocladus trichomanoides, Don.

Celery Pine of New Zealand, northern island; it is also called

Pitch Pine by the colonists; native name, **Tanekaha.** This tree attains a height of 70 feet, with a straight stem of 3 feet in diameter, and furnishes a pale close-grained timber, strong, heavy, and remarkably durable, according to Professor Kirk, greatly valued for mine-props, struts, caps, sleepers, water-tanks, bridge planks and piles, and spars; the Maories employ the bark for dyeing red and black.

Phyllostachys bambusoides, Siebold.

Himalaya, China, and Japan. A dwarf species, but hardy, and the yellowish canes available for excellent walking-sticks (Griffith).

Phyllostachys nigra, Munro.* (*Bambusa nigra*, Loddiges.)

China and Japan. Up to 25 feet high. The stems nearly solid and becoming black. Has withstood severe frost in the south of France and at Vienna. Known to have grown 16 feet in six weeks. Bamboo chairs and walking-sticks often made of this species. A Japan species of this bambusaceous genus proved hardy in Scotland.

Physalis Alkekengi, Linné.

The Strawberry Tomato or Winter Cherry. Middle and South Europe, North Africa, Middle Asia, extending to Japan, said to have come originally from Persia. A perennial herb. The berry, which is red and of a not unpleasant taste, has some medicinal value. The leaves contain a bitter principle—physalin.

Physalis angulata, Linné.

In many tropical countries, extending as a native plant to the northern parts of the United States and to Japan. An annual herb. Yellowish; the berries edible. P. minima, L. (*P. parviflora*, R. Br.), appears to be a variety and extends also into tropical Australia.

Physalis Peruviana, Linné.

Temperate and tropical America, widely naturalised in many countries of the warmer zones. With double inaptness called the Cape Gooseberry. A perennial herb; but for producing its fruit well, it requires early renovation. The acidulous berries can be used as well as a table fruit as for preserves. Doubtless several other kinds of Physalis can be utilised in the same manner. In colder countries the P. Peruviana becomes annual.

Pilocarpus pinnatifolius, Lemaire.

One of Jaborandi plants of tropical and sub-tropical Brazil. The leaves and bark of this shrub, which contain essential oil and a peculiar alkaloid, are famed as an agreeable, powerful, and quickly-acting sudorific. This bush is likely to endure the clime of milder temperate forest regions (Continho, Baillon, Hardy, Guebler). Like *P. simplex*, also an active sialogogue.

Pimpinella Anisum, Linné.

The Anise Plant. Greece, Egypt, Persia. An annual. The seed-like fruits enter into various medicines and condiments, and are also required for the distillation of oil, rich in anethol. The herbage left after obtaining the seeds serves for fodder.

Pimpinella saxifraga, Linné.

Europe, North and Middle Asia. A perennial herb; its root used in medicine; a peculiar volatile oil can be distilled from the root. P. magna (L.) is a closely allied species, and P. nigra (W.) is a variety. The root of the last is particularly powerful.

Pimpinella Sisarum, Bentham. (*Sium Sisarum,* Linné.)

East Asia. A perennial herb. The bunches of small tubers afford an excellent culinary vegetable. The taste is sweet and somewhat celery-like. The roots endure frost.

Pinus Abies, Du Roi.* (*Pinus Picea,* Linné.)

Silver Fir, Tanne. In Middle Europe up to 50° north latitude, forming dense forests. A fine tree, formerly the charm of the ancients, attaining 200 feet in height, and 20 feet in circumference of stem, reaching the age of 300 years. It furnishes a most valuable timber for building as well as furniture, and in respect to lightness, toughness, and elasticity it is even more esteemed than the Norway Spruce, but is not so good for fuel or for charcoal. It also yields a fine white resin and the Strasburg turpentine, similar to the Venetian. Besides the above normal formal form, the following two main varieties occur: P. Abies *var,* Cephalonica, Parlatore (*P. Cephalonica,* Endl.). Greece, 3,000 to 5,000 feet above the sea. A tree 60 feet high, with a stem circumference of 10 feet. The wood is very hard and durable, and much esteemed for building. General Napier mentions that in pulling down some old houses at Argostoli, which had been built 150 to 300 years, all the wood-work of this fir was found as hard as oak

and perfectly sound. P. Abies *var.* Nordmanniana, Parlatore (*P. Nordmanniana*, Steven), Crimea and Circassia, 6,000 feet above the sea. This is one of the most imposing firs, attaining a height of 100 feet, with a perfectly straight stem. It furnishes a valuable building timber. The Silver Fir is desirable for mountain forests. It will grow on sand, but only half as fast as P. Pinaster.

Pinus alba, Aiton.

White Spruce. From Canada to Carolina, up to the highest mountains. It resembles *P. picea*, but is smaller, at most 50 feet high. The bark richer in tannin than that of the Hemlock Spruce. The timber well adapted for deal boards and many other purposes, but on the whole inferior to Black Spruce. The tree grows in damp situations or swampy ground. Eligible for Alpine country.

Pinus Alcocqiana, Parlatore.

Japan, at an elevation of 6,000 to 7,000 feet. A fine tree, 120 feet high, with very small blue-green leaves; the wood is used for light household furniture. P. tonga and P. polita ascend there to the same height (Rind).*

Pinus amabilis, Douglas.

Californian Silver Fir. North California, at an elevation of from 4,000 to 7,000 or even 10,000 feet. A handsome Fir, 200 feet high, circumference of stem 24 feet; the stem is naked up to 100 feet. The tree passes under the name of the " Queen of the Forests " (Lemmon). The wood is elastic, strong, and hard, fit for masts and spars; it has a peculiar red colour; spikes, nails, and bolts hold firm and never corrode in it (Dufur).

Pinus Australis, Lichaux.*

Southern or Swamp Pine, also called Georgia, Yellow Pitch, Long-leaved Yellow or Broom Pine. In the Southern States of North America the tree attains a height of 100 feet. It furnishes a good timber for furniture and building, also for naval architecture and for flooring. According to Dr. Little the tree produces 30,000 feet of first-class heartwood timber per acre. It is this tree which forms chiefly the extensive Pine barrens of the United States, and yields largely the American turpentine, as well as resin, pitch, and tar. Porcher observes that the tree shoots up devoid of branches for sometimes as much as 60 feet, and he calls it " one of

the greatest gifts of God to man." The emanations from Pines, particularly the very resinous species, are antimalarian and antiseptic, as proved by residences near Pine forests, and by the use of hospital buildings constructed of Pine wood.

Pinus Ayacahuite, Ehrenberg. (*P. Loudoniana*, Gordon.)

In Mexico, at an elevation of 8,000 to 12,000 feet. An excellent Pine, 100 to 150 feet high, with a stem diameter of 3 to 4 feet. It has the habit of P. excelsa, and is equal to it in its own line of beauty (Beecher) and in hardiness,—yielding a much-esteemed white or sometimes reddish timber.

Pinus balsamea, Linné.

Balsam Fir, Balm of Gilead Fir. Canada, Nova Scotia, south to New England, Pennsylvania, and Wisconsin. An elegant tree, 40 feet high, which with Pinus Fraseri yields the Canada balsam, the well-known oleo-resin. The timber is light, soft, and useful for furniture and implements. The tree does not attain a very great age. Sends a pleasant odour through the forest regarded as salubrious, especially in phthisis diseases—a remark which applies to many other pines. It thrives best in cold, swampy places. Eligible for Alpine regions.

Pinus bracteata, D. Don.

Southern California, up to 6,000 feet. A very handsome tree, attaining 150 feet in height, with a slender, perfectly straight stem, not more than 2 feet in diameter. The resin is used for incense.

Pinus Brunoniana, Wallich. (*P. dumosa*, D. Don.)

Himalaya, descending to 8,000 and ascending to 10,500 feet. Attains a height of 120 feet, and the stem a circumference of 28 feet (J. D. Hooker). Particularly eligible for Alpine tracts. The timber is pale and soft, and does not stand exposure well.

Pinus Canadensis, Linné.

Hemlock Spruce. In Canada and over a great part of the United States, on high mountains, as well as on undulating land. A very ornamental tree, 100 feet high, with a white cross-grained wood remarkably durable when used for submerged water-works; also employed for railway ties. Accord-

ing to Vasey it is one of the most graceful of Spruces with a light and spreading spray. Next to P. Strobus it is the highest pine of the Eastern States of North America. The tree is extremely valuable on account of its bark, which is much esteemed as a tanning material, containing 9 to 14 per cent. tannin. It is much liked as an admixture to oak bark for particular leathers of great toughness, wearing strength, and resistance to water. The extract of the bark for tanning fetches in the London market from £16 to £18 a ton, and is imported to the extent of about 6,000 tons a year; it is stripped off during the summer months. The young shoots are used in making spruce-beer.

Pinus Canariensis, C. Smith.*

Canary Pine. Canary Islands, forming large forests at an elevation of 5,000 to 6,000 feet. A tree 70 feet high, with a resinous, durable, very heavy wood, not readily attacked by insects. It thrives well in Victoria, and shows celerity of growth. Will endure an occasional shade temperature of 118° F. (W. J. Winter).

Pinus Cedrus, Linné.

Cedar of Lebanon. Together with the Atlas variety on the mountains of Lebanon and Taurus, also in North Africa. The tree grows to a height of 100 feet, with a healthy trunk up to 36 feet in circumference, and attains a very great age; the wood is of a light-reddish colour, soft, inodorous, easy to work, and much esteemed for its durability.

Pinus Cedrus, *var.* Deodara.*

Deodar Cedar. On the Himalaya Mountains, 3,000 to 12,000 feet above the sea-level. A majestic tree, reaching a height of more than 200 feet, and sometimes 30 feet in circumference of stem. The wood is of a light-yellow colour, very close-grained and resinous, strongly and agreeably scented, light, extremely durable, well resisting the vicissitudes of a variable clime, and furnishes one of the best building-timbers known. Pillars of Kashmir mosques of this wood are found sound after 400 years, and bridges of still greater antiquity are in existence. White ants hardly ever attack the heartwood. Boats built of this wood last forty years. It is also extensively used for canal-edges and for railways. The tree should not be felled too young. It also yields a good deal of resin and turpentine. A humid clime very much accelerates the growth of this Pine, which in forest-ranges would come best and quickest to its development. Deodars will endure, when

not too young, an exceptional temperature of 118° F. in the shade (W. J. Winter).

Pinus Cembra, Linné.

On the European Alps, also in Siberia and Tartary. Less hardy than P. Laricio, although from the higher Alps. The tree attains a height of 120 feet, the stem upwards of 4 feet in diameter; the wood is of a yellow colour, very soft and resinous, of an extremely fine texture, and is extensively used for carving and cabinet work. The seeds are edible, and when pressed yield a great quantity of oil. A good turpentine is also obtained from this Pine.

Pinus cembroides, Zuccarini. (*P. Llaveana*, Schiede and Deppe.)

Mexican Swamp Pine. A small tree, 30 feet high, growing at an elevation of 8,000 to 10,000 feet. The timber is not of much use, but the seeds are edible and have a very agreeable taste.

Pinus Cilicica, Antoine and Kotschy.

Cilician Silver Fir. Asia Minor. 4,000 to 6,500 feet above sea-level. A handsome tree of pyramidal growth, 160 feet high. Quite hardy in climes like that of Vienna. The wood is very soft and used extensively for the roofs of houses, as it does not warp.

Pinus concolor, Engelmann.

North-West America, at elevations of 8,000 to 9,000 feet. Tree only 50 feet high. The wood is tough, eligible for building purposes and other substantial work (Vasey).

Pinus contorta, Douglas. (*P. Bolandri*, Parlatore.)

On high damp ranges in California, attaining 50 feet in height, also abundant on the mountains of Colorado, and very eligible for clothing rocky hill-sides (Meehan). In California it forms dense thickets along the coast, and is in this respect as valuable as P. Laricio, P. Pinaster, and P. Haleppensis in Europe, as a shelter-tree in stormy localities. Dr. Gibbons remarks of this pine, which vernacularly is called Tamarak or Hack-me-tack, that its size has generally been understated. At the foot of the Sierra and on mountains 8,000 feet high he saw great numbers of it, forming the most stately of forest pines, not rarely attaining a height of 150 feet and 4 feet in diameter. The timber is there considered the best and most durable material for dams and for general building purposes.

It furnishes sea-ports with piles and masts, also railway ties. Its value is beyond calculation (Gibbons).

Pinus Coulteri, D. Don.

California, on the eastern slope of the coast range, at an elevation of 3,000 to 4,000 feet. A Pine of quick growth, attaining a height of about 100 feet, with a trunk up to 4 feet in diameter; it has the largest cones of all Pines, comparable in size and form to sugar-loaves. The nuts are nutritious (Vasey).

Pinus densiflora, Siebold and Zuccarini.

Japan, in the interior of Nipon, where it forms, along with P. Massoniana, extensive forests at 1,000 to 2,000 feet above sea-level. Attains an age of several centuries (Rein). The timber is excellent for building.

Pinus Douglasii, Sabine.*

Oregon Pine, called also the Yellow Pine of Puget Sound, where it yields the principal timber for export, and is therefore of great commercial value in the lumber-trade. It extends from Vancouver's Island and the Columbia River, through California to Northern Mexico, from the coast up to the higher mountains of 9,000 feet. The maximum height known is 400 feet, the greatest diameter of the stem 14 feet. Can be grown very closely, when the stems will attain, according to Drs. Kellogg and Newberry, a height of over 200 feet without a branch. The timber is fine and clear-grained, soft and easily worked, firm and solid, splendid for masts and spars, ships' planks, and piles. It will bear a tension of 3 to 1 as compared with the Segorias, also for flooring, being for that purpose regarded as the best of California (Bolander). It is the strongest wood on the North Pacific coast, both in horizontal strain and perpendicular pressure. Sub-Alpine localities should be extensively planted with this famous tree. It requires deep and rich soil, but likes shelter; its growth is at the rate of the Larch; it passes in various localities as Black and Red Spruce. Both in clayey and light soil it attains 50 feet in about eighteen years; it requires, however, a moist forest clime for rapid growth.

Pinus edulis, Engelmann.

New Mexico. A tree, not tall, but very resinous. Wood easily split. One of the best of fuel wood (Meehan). It yields the "Pino" nuts, of exceedingly nice taste and produced in immense quantities (Sargent).

Pinus excelsa, Wallich.*

The Lofty or Bootan Pine. Himalaya, forming large forests, at from 5,000 to 12,500 feet elevation; also in Macedonia and Montenegro. A fine tree, 150 feet high, furnishing a valuable, close-grained, resinous, soft and easily workable wood, ranking among Himalayan Pine-woods for durability next to Deodar timber (Stewart and Brandis). It also furnishes a good quantity of turpentine. Under cultivation it shrinks before a fierce summer sun (Beecher).

Pinus firma, Antoine.

North Japan, at 2,000 to 4,000 feet above the sea-level in humid valleys. A lofty tree of the habit of the Silver Fir. The timber is white, soft, and fine-grained, employed particularly by coopers and upholsterers.

Pinus flexilis, James.

The White Pine of the Rocky Mountains, also known as the Bull Pine from New Mexico to British Columbia, ascending to 13,000 feet. Prefers the limestone formation. A valuable Fir for cold regions. It attains a height of 150 feet, according to Dr. Gibbons. J. Hoopes mentions that it is of slow growth. Wood pale and compact, of fine texture.

Pinus Fortunei, Parlatore.

China, in the neighbourhood of Foo-Chow-Foo. A splendid tree, 70 feet high, somewhat similar in habit to P. Cedrus.

Pinus Fraseri, Pursh.

Double Balsam Fir. On high mountains of Carolina and Pennsylvania. This tree, which grows to a height of about 20 feet, yields with P. balsamea Canada balsam.

Pinus Gerardiana, Wallich.

Nepal Nut-Pine. In the north-eastern parts of the Himalaya at an elevation of 10,000 to 12,000 feet, forming extensive forests. The tree attains a height of 50 feet, with a comparatively short stem, and produces very sweet edible seeds, also turpentine. Hoopes refers to it as remarkable for the copiousness of its resin. In reference to the nut-like seeds, the proverb prevails at Kunawar, " One tree a man's life in winter."

Pinus glabra, Walter.

Carolina. Allied to P. mitis. It attains, according to Chapman,

a height of 60 feet. Porcher compares the wood to that of P. Strobus.

Pinus grandis, Douglas.

Great Silver Fir of North California, also known as the Yellow Fir of Oregon. A splendid quick-growing Fir, 200 feet high and upwards, growing best in moist valleys of high ranges. The stem occasionally attains a diameter of 7 feet at 130 feet from the ground, and of 6 feet at 200. Trees occur of 15 feet diameter and 320 feet high; the wood is white and soft, too light and brittle, according to Vasey, for general purposes. It is, however, employed for boards, boxes, cooperage, and much sought for ship-building (Brewer).

Pinus Griffithii, Parlatore. (*Larix Griffithii,* J. Hooker and Thomson).

The Himalayan Larch. Descends to 8,000 feet and ascends to 12,000 feet. Timber pale, soft, without distinct heartwood, one of the most durable of all Pine timbers (Stewart and Brandis). P. Ledebourii, Endlicher, is the Siberian Larch.

Pinus Haleppensis, Miller.

Aleppo Pine. South Europe and North Africa. This well-known Pine attains a height of 80 feet, with a stem of from 4 to 5 feet in diameter. The timber of young trees is white, of older trees of a dark colour; it is principally esteemed for ship-building, but also used for furniture. The tree yields a kind of Venetian turpentine, as well as a valuable tar. Although ascending mountains in South Europe to the height of 4,000 feet, it thrives best in loose coast-sands, where in ten years it will attain to 25 feet, and finally will become a larger tree than on firm lands. M. Boitel has published a special work on the importance of this pine for converting poor sand-land into productive areas, also on P. silvestris and P. Laricio for the same purpose. According to Mr. W. Irvine Winter, it will resist a heat of 118° F. in the shade. We find the Aleppo Fir one of the best avenue trees in Victoria, as first proved by the writer. P. maritima is a variety of this species. Content with the poorest and driest localities and rapid of growth.

Pinus Hartwegii, Lindley.

Mexico, 9,000 to 13,000 feet above sea-level. A Pine 50 feet in height, with a very durable wood, of a reddish colour; it yields a large quantity of resin.

Pinus Hudsonica, Poiret. (*P. Banksiana,* Lamb.)

Grey Pine. North America, up to 64° north latitude. Height of tree 40 feet; in the cold north only a shrub. The wood is light, tough, and easily worked.

Pinus Jezoensis, Antoine and Endlicher.

Japan. A large tree, with light, soft, smooth timber, used principally for household utensils.

Pinus Kæmpferi, Lambert.

Chinese Larch; also called Golden Pine. China. This is the handsomest of all the Larches. It is of quick growth and attains a height of 150 feet. The leaves, which are of a vivid green during spring and summer, turn to a golden yellow in autumn. The wood is very hard and durable.

Pinus Koraiensis, Siebold and Zuccarini.

China and Japan. A handsome tree, 30 to 40 feet high, producing edible seeds.

Pinus Lambertiana, Douglas.*

Shake-Giant or Sugar-Pine. North-west coast of America, mostly in great altitudes. A lofty tree, of rapid growth, upwards of 300 feet high, with a straight naked stem of from 20 to 60 feet in circumference. It thrives best in sandy soil, and produces a soft, white, straight-grained wood, which for inside work is esteemed above any other Pine in California, and furnished in large quantities; it is especially used for shingles, flooring, and for finishing purposes by joiners and carpenters. The tree yields an abundance of remarkably clear and pure resin, of sweet taste, used instead of sugar by the natives. The cones are 18 inches long; the seeds are edible and used as food by the natives. Would come best to perfection in the humid regions of our higher mountains. The timber serves also for flooring.

Pinus Laricio, Poiret.*

Corsican Pine. South Europe. It attains a height of 120 feet. A splendid shelter tree in the coldest regions. It will succeed on stiff clay as well as on sandy soil, even on sea-sand. The wood is white, towards the centre dark, very resinous, coarse-grained, elastic and durable, and much esteemed for building, especially for water-works; valuable for its permanency underground. There are three main varieties of this Pine, *viz.:* P. L. Poiretiana, in Italy; P. L. Austriaca, in

Austria; P. L. Pallasiana, on the borders of the Black Sea. The tree grows best in calcareous soil, but also in poor sandy soil, where, however, the timber is not so large nor so good. It yields all the products of P. silvestris, but in greater quantities, being perhaps the most resinous of all Pines.

Pinus Larix, Linné.

Common Larch; deciduous. On the European Alps, up to 7,000 feet. Of quick growth in cool localities. It attains a height of 100 feet, sometimes rising even up to 160 feet, and produces a valuable timber of great durability, which is used for land and water buildings, and much prized for ship-building; for staves of wine casks almost indestructible, not allowing the evaporation of the spirituous contents (Simmonds). The bark is used for tanning and dyeing. The tree is of great importance for its yield of the Venetian turpentine, which is obtained by boring holes into it in spring; these fill during the summer, supplying from half to three-quarters of a pint of turpentine. In Piedmont, where they tap the tree in different places and let the liquid continually run, it is said that from seven to eight pints may be obtained in a year, but the wood suffers through this operation. P. L. *var.* Rossica, Russian Larch, grows principally on the Altai Mountains, from 2,500 to 5,500 feet above sea-level; it attains a height of 80 feet. The species would be important for upland country.

Pinus leiophylla, Schiede and Deppe.

7,000 to 11,000 feet upon the mountains of Mexico. A tree 90 feet high. The wood is excessively hard.

Pinus leptolepis, Siebold and Zuccarini.

Japan Larch. In Japan, between 35° and 48° north latitude, up to an elevation of 9,000 feet. Never a very tall tree. The timber, when mature, reddish brown and soft; it is highly valued by the Japanese.

Pinus longifolia, Roxburgh.*

Emodi Pine or Cheer Pine. On the Himalaya Mountains, from 2,000 to 9,000 feet. A handsome tree with a branchless stem of 50 feet, the whole tree attaining a maximum height of somewhat over 100 feet, the girth of the stem 12 feet. The wood is resinous, and the red variety useful for building; it yields a quantity of tar and turpentine. The tree stands exposure and heat well. According to W. J. Winter it endures an occasional shade temperature of 118° F.

Pinus Massoniana, Lambert. (*P. Sinensis,* Lamb.)

China and Japan. The most common of all trees in Japan, called there the "Matz." It attains a stem diameter of 6 feet, a height of 100 feet, and an age of several centuries. It prefers sandy soil. Splendid for avenues (Rein). It supplies a resinous, tough, and durable wood, used for buildings and furniture. The roots, when burned with the oil of Brassica Orientalis, furnish the Chinese Lampblack.

Pinus Menziesii, Douglas.

North-West America. The Blue Spruce of California, also called Tideland Spruce, ascending to elevations of 9,000 feet, of rapid growth in congenial soil. A very handsome tree, which grows to a great height, and furnishes a valuable pale and fine-grained timber; used largely for piles (Dr. Gibbons). It thrives best in moist ground. According to Professor Brewer, instances are on record of trees having attained a height of over 300 feet, and a stem 7 feet in diameter at 100 feet from the base. From an exceptionally large tree 100,000 shingles were obtained, besides 58 cords of wood.

Pinus Mertensiana, Bongard.

Californian Hemlock Spruce. North-West America. The wood is white, tough, and very soft, but is often used for building. The tree is from 100 to 150 feet high, with a stem of 4 to 6 feet in diameter.

Pinus mitis, Michaux.

Yellow Pine of North America. In dry sandy soil, attaining a height of 60 feet. Wood durable, fine-grained, moderately resinous, valuable for flooring, cabinet-work and ship-building. According to Dr. Vasey it commands a higher price even than that of P. Strobus.

Pinus monophylla, Torrey. (*P. edulis,* Engelmann.)

Stone or Nut Pine of California, on the Sierra Nevada and Cascade Mountains, 6,500 feet. It thrives best on dry limestone soil. The seeds are edible, of an almond-like taste, and consumed in quantity by the natives. Height of tree generally about 35 feet, but occasionally as much as 80 feet; stem not of great thickness. Not of quick growth.

Pinus montana, Du Roi. (*P. Pumilio,* Hænke.)

On the Alps and Carpathians up to the highest points, covering large tracts, and thriving on the poorest soil. The tree,

which grows about 25 feet high, in favourable localities 50, yields much oil of turpentine. The wood is used for carving and for firewood. Only available to advantage for highlands.

Pinus Montezumæ, Lambert. (*P. Devoniana,* Lindley; *P. Grenvilleæ,* Gordon.)

Mexico. A handsome Pine, 80 feet high; wood white, soft, and resinous.

Pinus monticola, Douglas.

British Columbia and California, at an elevation of 7,000 feet. It thrives best in poor soil of granite formation, and attains the height of 200 feet, with a stem of 1½ to 7 feet thick. The wood is white, close-grained, similar to that of P. Strobus. Dr. Gibbons observes that it is less than half the size of P. Lambertiana, but in all other respects resembles it. Woodmen are very pronounced in their statement that there are two kinds of Sugar Pine, both growing in close proximity to each other. J. Hoopes states that the wood is similar to White Pine, but tougher.

Pinus muricata, D. Don.

Bishop's Pine. California. Found up to 7,500 feet. This Pine grows to about 40 feet. It might be utilised for windbrakes (Dr. Gibbons).

Pinus nigra, Aiton.

Black Spruce. North-East America, occurring extensively between 44° and 53° north latitude. This tree, which is termed Double Spruce by the Canadians, attains a height of 70 feet, and furnishes a light elastic timber of pale colour, excellent for yards of ships. The young shoots are used for making spruce-beer and the small roots serve as cords. The tree prefers poor and rocky soil, but a humid cool clime, and is best available for mountainous localities inaccessible to culture. Mr. Cecil Clay estimates that 20,000 cubic feet of timber can be obtained from this tree on one acre of ground.

Pinus nobilis, Douglas.

Noble White Fir; also known as Red Fir. North-west coast of America, on the Columbia River and the mountains of North California, where it forms extensive forests at 6,000 to 8,000 feet. A majestic tree, 150 to 200 feet high, 4 feet in diameter, with regular horizontal branches, furnishing a splendid timber. P. magnifica, Murray, is a variety.

Pinus Nuttallii, Parlatore.

The Oregon Larch, at elevations of from 3,000 to 6,000 feet. According to Dr. Gibbons, one of the most graceful trees. Stem frequently 200 feet to the first limb. Timber fissile, very strong and durable (Dufur).

Pinus obovata, Antoine. (*P. Schrenkiana*, Antoine.)

North-Eastern Europe and Northern Asia. Somewhat like the Norway Spruce. Wood soft and pale, much used for furniture and household implements, also packing-boxes of great durability (Regel).

Pinus orientalis, Linné.

Sapindus Fir. In Asia Minor, at 4,000 feet. The tree rises to about 80 feet, and resembles somewhat the Norway Spruce. The wood is exceedingly tough and durable.

Pinus Parryana, Engelmann.

California. One of the pines with edible nuts.

Pinus parviflora, Siebold.

Curiles and Japan. A middle-sized tree of longevity; ascends to Alpine heights. Much used as an avenue tree. Wood for pine furniture and boat-building.

Pinus Pattoniana, Parlatore.

California, 5,000 to 6,000 feet above sea-level. A very fine Fir, 300 feet high, with a perfectly straight stem. The wood is hard, of a reddish colour, with handsome veins, but poor in resin.

Pinus patula, Schiede and Deppe.

In Mexico, at an elevation of 8,000 to 9,000 feet. A graceful Pine, 80 feet high.

Pinus pendula, Bolander. (*P. microcarpa*, Lambert.)

From Labrador and Canada to Virginia. Small-coned American Larch, Black Larch, or Tamarack, delighting in swampy ground. A Pine of pyramidal growth, 100 feet high. The timber is pale, heavy, resinous, and as highly valued as that of the Common Larch. It is closegrained, well adapted for underground work; it combines lightness, strength, and durability; much sought by shipbuilders, as for knees, bends, and ship garlands it cannot be surpassed (Robb).

Pinus picea, Du Roi.* (*P. Abies*, Linné.)

Norway Spruce, Fichte. Middle and Northern Europe and Northern Asia, rising from the plains to an elevation of 4,500 feet, and forming extensive forests. It exceeds even the Birch in endurance of cold. Adapted to most kinds of soil. The tree attains a height of 150 feet or even more, and furnishes an excellent timber for building and furniture, for masts, spars, ladders, oars, &c., commonly known under the name of White Deal. It also produces the Burgundy Pitch in quantity, while the bark is used for tanning. Though enduring dry summers, this Spruce would have to be restricted for timber purposes to the damp mountains.

Pinus Pinaster, Bolander.*

Cluster Pine. On the shores of the Mediterranean. This tree is of quick growth, and rises up to 60 feet in height. The wood is soft and resinous; it yields largely the French turpentine. Among the best Pines for consolidation of sandy coast-land, and converting rolling sands into pasture and agricultural land. For ease of rearing and rapidity of growth, one of the most important of all Pines. On the testimony of Mr. J. Hoopes it does not thrive well on calcareous soil. W. J. Winter observed that P. Pinaster and the allied P. pinea can withstand a shade temperature of 118° F. A tree 60 to 70 years old, heavily tapped, yields 12 to 16 lbs. of turpentine, equal to about 4 lbs. of resin and the rest oil of turpentine (Simmonds). The tree comes into full flow of turpentine at about 25 years, and the tapping process, if only a slight one, is endured by this Pine for an enormous length of time. The annual production of resin from a good tree fluctuates between 5 and 8 lbs., if moderately tapped. The quantity of resin gathered in France during 1874 was about sixty million pounds (Crouzetter-Desnoyers).

Pinus Pincaena, Gordon.

Mexico, up to 9,000 feet above sea-level. A very remarkable Pine, having drooping branches like the Weeping Willow, 60 feet high. Most desirable for cemeteries.

Pinus Pindrow, Royle.

In great abundance on the spurs of the Himalaya Mountains, 8,000 to 12,000 feet above the sea-level. A fine, straight-stemmed tree, 100 feet high; cones purple.

Pinus Pinea, Linné.*

Stone Pine. Frequent in the countries bordering on the

Mediterranean. Height of tree 60 feet. The wood is whitish, light, but full of resin, and much used for buildings, furniture, and ships. The seeds are edible, somewhat resembling almonds, but of a resinous though not disagreeable taste; they should be left in the cones until they are about to be used, as otherwise they speedily become rancid; they only ripen in their third year. This Pine grows as easily and almost as quickly as the Cluster Pine.

Pinus Pinsapo, Boissier.

Spanish Fir. In Spain, on the Sierra Nevada, 4,000 to 6,000 feet. A tree 60 feet high, with branches from the ground. The timber is similar to that of the Silver Fir.

Pinus polita, Antoine.

Japan and Kurile Islands. A tall superb tree, forming large forests on the mountain ranges (A. Murray).

Pinus ponderosa, Douglas.* (*P. Benthamiana,* Hartweg.)

Yellow or Pitch Pine or Trucker Pine of the mountains of North-West America. Height of tree up to 225 feet, with a stem of 24 feet in circumference, of comparatively quick growth. The wood is heavy, and for general purposes preferred to that of any other Pine. There are fine groves of this tree up to 5,000 feet in California. P. Jeffreyi (Murray) is, according to Dr. Vasey, a variety of this species. The variety P. Englemanni, Parry, ascends to 12,000 feet. The bark contains a considerable quantity of tanning substance. Wood pale and soft, neither knotty nor resinous, much esteemed for cabinet-work (Hoopes). It is of great strength, and is used for floors, joists, etc. Dr. Gibbons relates that the wood, with the bark adherent, exposed to the weather, will decay within a year, but that when stripped and covered with soil it is very durable. Dr. Kellogg saw logs which had been in the ground twelve years quite sound. Has proved well adapted even for dry localities, in Victoria.

Pinus pseudo-strobus, Lindley.

In Mexico. This tree is superior in appearance to any other Mexican Pine; height 80 feet.

Pinus pungens, Michaux.

Eastern States of North America. Although seldom over 50 feet high, this Pine has the recommendation of being of remarkably quick growth.

Pinus Pyrenaica, Lapeyrouse. (*P. Brutia*, Tenvre.)

In the south of Spain and on the Pyrenees. A fine ornamental tree of quick growth, 80 feet high; the wood is pale and dry, free of resin, and of considerable value.

Pinus radiata, Don.* (*P. insignis*, Douglas.)

California. A splendid Pine, fully 100 feet high, with a straight stem, 2 to 4 feet in diameter. It is of remarkably rapid growth, a seedling one year old being strong enough for final transplantation; it has been noticed to grow fully 5 feet in a year, in light soil near Melbourne. Mr. Dickinson found it to attain at Port Phillip a height of 57 feet with a girth of 4½ feet in 11 years. According to Mr. W. J. Winter it will endure unhurt exceptional exposure to 118° F. in the shade. In the United Kingdom it suffers greatly from the attacks of the Pine Beetle, Hylurgus piniperda (Lawson). The wood is tough, and is much sought for boat-building and various utensils. This tree can be utilised for obtaining tar and pitch. It bears exposure to the sea at the very edge of the coast.

Pinus religiosa, Humboldt.

Oyamel Fir. Mexico, 4,000 to 9,000 feet above the sea-level. A magnificent tree with silvery leaves, growing 100 feet high; stem 6 feet in diameter. The wood is particularly well fitted for shingles and lathes. It endures the middle European winter.

Pinus resinosa, Bolander.

Red Pine. North America, principally Canada and Nova Scotia, extending to Pennsylvania. It attains a height of 80 feet and 2 feet in diameter. It is of rapid growth, and on account of the red-barked stem very ornamental (Sargent); delights in sandy soil; the wood is red, fine-grained, heavy and durable, very resinous, and is used for ship-building.

Pinus rigida, Miller.*

American Pitch Pine. From New England to Virginia. It grows to a height of 80 feet; the timber from light gravelly or rocky soil heavy and resinous, from damp alluvial soil light and soft; used for building; but the tree is principally important for its yield of turpentine, resin, pitch and tar. The tree is suitable for sea-shores; it will also grow in the driest localities, nor is it readily susceptible to injury from fire.

Pinus rubra, Lambert.

Hudson's Pine, Red Spruce. Newfoundland, Nova Scotia,

and northern parts of the American continent. A straight slender tree, 70 feet high; the wood is of a reddish colour and highly esteemed.

Pinus Sabiniana, Douglas.*

Californian Nut Pine or White Pine. Most frequent on the western slopes of the Rocky Mountains, intermixed with other trees; 150 feet high; stem 3 to 5 feet in diameter. The wood is pale and soft; according to Dr. Gibbons it is, when seasoned, hard and durable, with a close and twisted grain, and contains much resin; the clustered heavy cones attain a length of one foot. The seeds are edible. They are produced in great profusion, and formed formerly a large portion of the winter food of the native tribes. Proves in dry localities of Victoria to be of quick growth.

Pinus serotina, Michaux.

Pond Pine. Southern States of North America, in black morassy soil, principally near the sea-coast. It is 50 feet high; stem 18 inches in diameter. The wood is soft.

Pinus Sibirica, Turczaninow. (*P. Pichta,* Fischer.)

Siberian Pitch Fir. On the Altai Mountains; it reaches a height of 50 feet.

Pinus silvestris, Linné.*

Scotch Fir, Foehre. Middle and Northern Europe, up to 70° north latitude, and North Asia, thriving best in sandy soil. Of all trees the one which needs the least of mineral aliment from the soil, hence adapted for pure sand, where it forms twice as much humus in the same time as Robinia pseudacacia or Poplars, while its wood is much more valuable. More easily transplanted than any other species (Wesseley). A very valuable tree, fully 100 feet high, growing to the age of about 120 years. It is important for masts and spars. The Red Baltic, Norway or Riga deals are obtained from this Pine, as well as a large portion of the European Pine-tar. Pine cones have in France come into use for tanning. Proves well adapted even for the drier parts of Victoria. The leaves of Pines can be well converted into material for pillows and mattresses, with the great recommendation of healthiness for such a purpose. All Fir forests are antimiasmatic and salubrious for hectic patients, in consequence of the dioxyde of hydrogen involved from their terebinthine emanations.

Pinus Smithiana, Lambert. (*P. Khutrow,* Royle.)

On the Himalayai Mountains, at elevations from 6,000 to 11,000 feet. Attains a height of 150 feet, and the stem a girth of 15 feet. The wood is pale, even and straight-grained, but only durable under shelter.

Pinus stenolepis, Parlatore. (*Picea Veitchii,* Lindley.)

Japan. Up to 7,000 feet. A fine tree, attaining a height of 140 feet.

Pinus Strobus, Linné.*

Weymouth Pine or American White Pine. North-Eastern America, growing on any soil, but particularly adapted for deep rich soil in mountain valleys; known to reach a height of 270 feet, with a stem of 8 feet diameter. It is the principal pine of the lumber trade of the Eastern States. One of the finest among ornamental conifers. The wood is soft, white, light, free of knots, almost without resin, easy to work, very durable, and much esteemed for masts, bridges, frames of buildings, flooring, oars, etc. It yields American turpentine and gallipot.

Pinus Tæda, Linné.

Frankincense or Loblolly Pine. Florida and Virginia, in sandy soil, attaining a height of 80 feet. The timber is used for pumps, etc. It also yields turpentine in good quantity, though of inferior quality. The tree likes the regions near the coast, hence can be utilised for raising Fir forests on sea-sand.

Pinus tenuifolia, Bentham.

Mexico, at an elevation of 5,000 feet, forming dense forests. Height of tree 100 feet, stem up to 5 feet in diameter.

Pinus Teocote, Chamisso and Schlechtendal.

Okote or Torch Pine. Mexico, 5,000 to 8,000 feet above the sea-level. Tree 100 feet high, stem 3 to 4 feet in diameter. It yields the Brea turpentine and resin; the wood is resinous and durable.

Pinus Torreyana, Parry.

California. An average cone of this Pine will contain about 130 seeds, weighing 3 ounces; they are edible (Meehan).

Pinus Tsuga, Antoine.

In the northern provinces of Japan, 6,000 to 9,000 feet above

the sea. The tree grows to only 25 feet high. Its timber is highly esteemed for superior furniture, especially by turners. It is of a yellowish-brown colour.

Pinus Webbiana, Wallich.

King-Pine, Dye-Pine. On the Himalaya Mountains, at an elevation of from 7,000 to 13,000 feet. A splendid Fir, reaching a height of 150 feet; the stem a circumference up to 30 feet. In compact forests the bare trunk is very short. The wood is of a pale colour, soft, coarse-grained, and very resinous, on the testimony of Mr. Webb equalling in texture and odour the Bermuda Cedar. The natives extract a splendid violet dye from the cones.

Pinus Williamsonii, Newberry.

California and Oregon, up to 12,000 feet. Height of tree 150 feet. Timber very valuable (Vasey).

Piptadenia rigida, Bentham.

Sub-tropical and extra-tropical South America. This acacia-like tree furnishes the angico-gum, similar to gum-arabic. The wood, according to Saldana da Gama, serves for naval constructions.

Pipturus propinquus, Weddell.

Insular India, South Sea Islands, and warmer parts of East Australia. This bush is higher and rather more hardy than Boehmeria nivea, but in fibre it is similar to that plant. P. velutinus (Wedd.) is closely allied. The few other species serve probably as well for fibre.

Pircunia dioica, Moquin.

Southern Brazil and La Plata States. A deciduous tree, for shady avenues grown in South Europe, as well as in many tropical countries, tested by the writer to be hardy in the lowlands of Victoria. It is comparatively quick of growth.

Pisonia aculeata, Linné.

Tropical and sub-tropical countries of both hemispheres, extending as a native plant into New South Wales. This rambling prickly bush can be chosen for hedge-copses.

Pistacia lentiscus, Linné.

The Mastic Tree. Mediterranean regions. A tall evergreen bush, exuding the mastic-resin, mostly through incisions into its bark. In Morocco it is extensively used for hedges.

Pistacia Terebinthus, Linné.

Countries around the Mediterranean Sea. A tall bush or small tree with deciduous foliage. The fragrant Cyprian or Chio turpentine exudes from the stem of this species.

Pistacia vera, Linné.

Indigenous in the Orient, as far as Persia. A deciduous tree, 30 feet high, yielding the Pistacio-nuts of commerce, remarkable for their green almond-like kernels. The likewise deciduous P. Atlantica (Desfontaines) and the evergreen South European P. lentiscus (L.), furnishing the mastic, rarely grow to the size of large trees.

Pisum sativum, Linné.

The Common Pea. Mediterranean countries and Western Asia. This annual of daily use could hardly be left disregarded on this occasion. Suffice it to say that the herbage as a nutritious fodder deserves more attention than it receives. The green fruit contains inosit-sugar and cholestrin fat. For field culture a sandy calcareous loam should be chosen for this plant, to ensure rich and safe harvests. Peas after four years' exposure to the extreme frosts of Polaris Bay retained their vitality. A second species, P. Aucheri (Jaub. and Spach), which is perennial, occurs in Alpine elevations on the Taurus.

Pittosporum tenuifolium, Banks and Bolander.

New Zealand. This with P. eugenioides has proved very suitable for tall garden-hedges, for which these and several other species were first brought into notice by the writer.

Pittosporum undulatum, Ventenat.

South-East Australia. This tree with P. bicolor (Hooker) produces a wood well adapted for turners' purposes and also as a substitute for boxwood (Oliver). The flowers furnish a highly fragrant volatile oil on distillation.

Planera aquatica, Gmelin.

North America. An elm-like tree, which can be chosen for plantations in wet localities. The wood is hard and strong.

Platanus occidentalis, Linné.

The true Plane Tree of the east part of North America, also known as Buttonwood. More eligible as an avenue tree than as a timber tree. Diameter of stem at times 14 feet. Wood dull red, light, not readily attacked by insects; used in

the manufacture of pianofortes and harps; cuts into very good screws, also presses, dairy utensils, windlasses, wheels, and blocks. The young wood is silky white and often handsomely mottled (Robb). The tree likes alluvial river banks and has been successfully planted in morassy places, to cope with miasmatic effluvia.

Platanus orientalis, Linné.

The Plane Tree of South Europe and Middle Asia. One of the grandest trees for lining roads and for street-planting, deciduous like the other Planes, rather quick of growth, and not requiring much water. Attains a height of 90 feet. It resists, in large towns such as London, the smoke better than any other tree, growing vigorously even under such disadvantage. It is of several centuries' longevity. The wood is well adapted for furniture and other kinds of cabinet-work.

Platanus racemosa, Nuttall.

The Californian Plane Tree. A good promenade-tree, which, according to Professor Bolander, grows more rapidly and more compact than P. occidentalis. Wood harder and thus more durable than that of P. occidentalis, also less liable to warp. According to Dr. Gibbons the tree attains a height of 100 feet and a diameter of 8 feet; the wood is very brittle; in use, however, by turners.

Plectocomia Himalaiana, Griffith.

Sikkim, up to 7,000 feet, extending to 27° south latitude. This Rattan Palm requires moist forest-land. Its canes are not durable, but this Palm is an object worthy of scenic horticulture, and would prove the hardiest among its congeners. P. elongata ascends, according to Drude, to 4,500 feet.

Plectocomia macrostachya, Kurz.

Tenasserim, at 3,000 feet elevation, therefore most likely hardy in temperate lowlands.

Plectronia ventosa, Linné.

South Africa. A hedge-bush, like P. ciliata (Sonder) and P. spinosa (Klotzsch).

Poa Abyssinica, Jacquin.

The Teff of Abyssinia. An annual grass. The grain there extensively use for bread of an agreeable acidulous taste.

Poa airoides, Koeler. (*Catabrosa aquatica*, Beauvois.)
Europe, North Africa, North and Middle Asia, North America. The Water-whorl Grass. A creeping grass, suitable for soil subject to inundation.

Poa alpina, Linné.
Alpine and Arctic Europe, Asia, and North America. Deserves to be transferred to snowy mountains as a nutritious perennial pasture-grass. P. Sudetica (Haenke) and P. hybrida (Guadin) are mentioned also as excellent Alpine grasses.

Poa angustifolia, Linné.
Europe, North Asia, North America. A perennial pasture-grass, allied to P. nemoralis. An excellent grass for moist meadows and river banks. Poa fertilis (Host.) may be a mere variety of this species.

Poa aquatica, Linné. (*Glyceria aquatica*, Smith.)
Europe, North and Middle Asia, North America. This conspicuous Water-grass attains a height of 6 feet. It is perennial, and deserves naturalisation in our swamps. It produces a large bulk of foliage, and may be disseminated for fodder purposes.

Poa Billardieri, Steudel.
Australia. A perennial rigid grass, of some value for saline meadows.

Poa Brownii, Kunth. (*Eragrostis Brownii*, Nees.)
Tropical and Eastern extra-tropical Australia. It is here mentioned as a valuable perennial species, keeping beautifully green in the driest Australian summer, even on poor soil. The section Eragrostis of the genus Poa contains numerous species in the hotter parts of the globe. Of these many would doubtless be hardy and prove of value as pasture in temperate climes.

Poa Canadensis, Beauvois.
The Rattlesnake Grass of South-East America. A valuable swamp-grass.

Poa Chinensis, Koenig.
South and East Asia, East Australia. Recommended by Mr. F. M. Bailey as a valuable pasture grass, perhaps on account

of its tender panicles. Poa bulbosa, L., of Europe and West Asia, and P. compressa, L., of the same regions, will grow in pure sand. The latter is a good lawn-grass.

Poa cynosuroides, Retz.

North-Eastern Africa, South Asia. A harsh perennial grass, not serviceable for fodder, but mentioned by Royle as a fibre-plant of North-Western India, where it is valued as a material for ropes. In this respect it may not surpass the rough tufty variety of Poa caespitosa, F., so common on river banks of South-East Australia, from the leaves of which excellent nets are made by the natives.

Poa digitata, R. Brown.

South-Eastern and Central Australia. Valuable for fixing wet river-banks and slopes. It forms large stools. Cattle and horses relish it.

Poa distans, Linné.

Europe, North Africa, Middle and Northern Asia, North America. Perennial. It is one of the limited number of tender grasses, suited for moist saline soil, and thus affords pasturage on coast marshes.

Poa fertilis, Host. (*P. serotina*, Ehrhart.)

Europe, North Asia, North America. Perennial. Important for wet meadows, even with sandy subsoil. Its foliage is tender, tasty, and nourishing. In mixtures of grasses it keeps up the growth late into the autumn; it will prosper also in sandy and saline soil.

Poa fluitans, Scopoli. (*Glyceria fluitans*, R. Brown.)

Europe, North Africa, Middle and North Asia, North America. The Manna Grass. Perennial. Excellent for stagnant water and slow-flowing streams. The foliage is tender. The seeds are sweet and palatable, and are in many countries used for porridge.

Poa maritima, Hudson.

Europe, North Africa, North Asia, North America. Its long creeping roots help to bind the coast sand. This grass can also be depastured.

Poa nemoralis, Linné.

Europe, North and Middle Asia, North America. This

perennial grass can be grown on shady forest land, as the name implies, but it accommodates itself also to open places, and will grow even among rocks. It endures Alpine winters. According to Lawson no better grass exists for displacing weeds on pleasure lawns; the same may be said of Poa compressa, L.

Poa pratensis, Linné.

The ordinary English Meadow-grass. A perennial species, fit for any meadows, thriving early, and able to live also in Alpine localities. Better adapted for pasture than hay. It is suitable for moor land, when such is laid dry; although it shoots only once in the season into flower, yet it forms a nutritious fodder, even on comparatively poor soil. It resists drought. It forms excellent sward, and with advantage can be used for intermixing it with other pasture grasses. In the United States it is known as the Kentucky Blue Grass or Pennsylvania Green Grass, and is considered one of the best for lawns, by Professor Meehan, as it will crowd out all weeds in time.

Poa trivialis, Linné.*

Europe, North Africa, Middle and Northern Asia. Also a good perennial grass for mixture on pasture land. One of the best grasses for sowing on ground recently laid dry. Recommendable also as a lawn grass. Sinclair regarded the produce of this Poa as superior to many other kinds, and noticed the marked partiality which horses, oxen, and sheep evince towards it. To thrive well it wants rather moist and rich soil and sheltered places. It is a later grass than P. pratensis, is well adapted for hay, and gives good after-growth (Langethal).

These few species of Poa have been singled out as recommendable, because they are well tested. Future experiments beyond Europe will add others to lists of recommendations like this.

Podachænium alatum, Bentham. (*Ferdinanda eminens,* Lagasca.)

Central America, up to a height of 8,000 feet. A tall shrub, for the grandeur of its foliage in requisition for scenic effects.

Podophyllum peltatum, Linné.

North America. A perennial forest-herb, not without importance for medicinal purposes. The root contains the bitter alkaloid berberin. Podophyllum Emodi (Wall.), occurring in the Indian mountains at heights from 6,000 to 14,000 feet, can probably be used like the American species. The berries of both are edible, though the root and leaves are poisonous.

Pogostemon Patchouli, Pellet.

Mountains of India. A perennial herb, famed for its powerful scent arising from a volatile oil. P. parviflorus (Benth.) and P. Heyneanus (Benth.) belong to this species.

Polianthes tuberosa, Linné.

Mexico. The Tuberose. Seemingly introduced only into South Asia; valuable for perfume distillation.

Polygala crotalaroides, Hamilton.

Temperate Himalaya. Praised as an ophidian alexipharmic. To several other species both of the eastern and western hemispheres similar properties are ascribed, but we are almost entirely without any reliable medical testimony on these and many other supposed vegetable antidotes against snake-poison.

Polygala Senega, Linné.

North America. A perennial herb. The root is of medicinal value.

Polygaster Sampadarius, Fries.

South-Eastern Asia. One of the most palatable of all truffles.

Polygonum tinctorium, Loureiro.

Japan and China. An annual herb, deserving attention and local trials, as yielding a kind of indigo. Its growth would be vigorous. Various Polygonums contain tannin, P. amphibium as much as 11½ per cent. (Gard. Chron.).

Polyporus giganteus, Fries.

Dr. Goeppert records this and also the following species as allowed to be sold for food in Silesia: *P. frondosus* (Fr.), *P. orinus* (Fr.), *P. tuberaster* (Fr.), *P. citrinus* (Pers.). Dr. Atkinson mentions as edible among the fungi of Cashmere P. fomentarius and P. squamosus.

Populus alba, Linné.

The Abele or White Poplar of Europe and Middle Asia, growing in the Himalayas up to 10,000 feet, ceasing at 4,000 feet. Height 90 feet. It proved an excellent avenue-tree, even in comparatively waterless situations, and gives by the partial whiteness of its foliage a pleasing effect in any plantation. The wood is pale, with a reddish tinge, brown near the centre, soft and light. It can be used for flooring; it is particularly sought for trays, bowls, bellows, and shoe-soles;

also, according to Porcher, for wooden structures under water. "Sparterie" for plaiting is obtained from the wood-shavings. The wood of this and some other Poplars is easily converted into paper-pulp, which again is cheaply bleached. Lines of Poplars along forest streams prevent the progress of wood conflagrations. The roots of Poplar spread widely. P. canescens (Sm.), the Grey Poplar, is either a variety of the Abele or its hybrid with the Aspen, and yields a better timber for carpenters and millwrights.

Populus angustifolia, James.

North America. A rather large tree of vigorous and rapid growth (Vasey); adapted for shelter-plantations, particularly in wet localities.

Populus balsamifera, Linné.

The Tacamahac or Balsam Poplar of the colder, but not the coldest, parts of North America; also in Siberia and on the Himalaya Mountains, where it ranges from 8,000 to 14,000 feet. It attains a height of 80 feet. The tree may be lopped for cattle fodder (Stewart and Brandis). Mr. Meehan says that it will grow near the ocean's brink. Its variety is P. candicans (Ait.).

Populus ciliata, Wallich.

Himalaya, from 4,000 to 10,000 feet. Height up to 70 feet with a straight trunk, which attains 10 feet in girth.

Populus Euphratica, Olivier.

From Algeria, dispersed to the Himalayas and Songaria, up to 13,500 feet. Height up to 50 feet. Wood harder than that of most Poplars, the inner wood turning black in old trees. It is used for planking and boat-building (Stewart and Brandis), also for beams, rafters, boxes, panneling, turnery. Cattle will browse on the leaves. This is the Willow of the 137th Psalm.

Populus grandidentata, Michaux.

North America. Sixty feet high. The Soft Aspen. P. angulata (Ait.) is another large Poplar of North-Eastern America.

Populus heterophylla, Linné.

The Downy Poplar of North America, passing also by the name of Cottonwood. Height 60 feet. The wood is very

Pritchardia filamentosa, Wendland.

Southern California, where this Palm attains a height of 50 feet.

Priva lævis, Jussieu.

Chili and the Argentine Republic. A perennial herb, the small tubers of which can be used for food (Philippi).

Prosopis dulcis, Kunth.

From Texas to the southern parts of the La Plata States. Vernacularly known as the Cashaw or Algaroba Tree. A thorny shrub, growing finally to a tree, attaining a stem of 1 foot in diameter, adapted for live-fences. The wood is durable and of extraordinary strength. This is one of the species yielding the sweetish Algaroba-pods for cattle fodder, and utilised even in some instances for human food. Argentina Algaroba-pods contain, according to Sievert, 25 to 28 per cent. grape sugar, 11 to 17 per cent. starch, 7 to 11 per cent. protein, of organic acids, pectin and other non-nitrogenous nutritive substances 14 to 24 per cent. They are also comparatively rich in potash, lime, and phosphoric acid. A sparkling drink called Aloja is made of the fruits. This and some allied species yield the Algarobylla bark for tanning; the leaves contain according to Sievert 21 per cent. tannin. The pods also of several species are rich in tannic acid. Mere varieties according to Bentham are: P. horrida, P. juliflora, P. siliquastrum, P. glandulosa. The latter variety exudes a gum not unlike gum-arabic, and this is obtained so copiously that children could earn two to three dollars a day in Texas while gathering it, latterly about 40,000 lbs. being bought by druggists there. The tree attains a height of 30 feet, and its wood is excessively hard. A short communication on the American Algaroba Tree was presented to the Parliament of Victoria by the writer in 1871. Pods of some Prosopis used as fodder have caused the death of horses in Jamaica.

Prosopis pubescens, Bentham.

Texas, California, New Mexico. Likely available for hedges, with other species of other countries.

Prosopis spicigera, Linné.

India, extending to Persia. A thorny tree, also with edible pods, possibly hardy. It attains a height of 60 feet, but is of slow growth. Serves for head-lines. It can be chosen for desert land (Kurz).

Prosopis Stephaniana, Kunth.

Syria and Persia. A shrubby species for hedge-growth.

Prunus Americana, Marshall. (*P. nigra,* Aiton.)

Canada, Eastern United States of America. A thorny tree, furnishing the Yellow and Red Plum of North America. The fruit is roundish and rather small, but of pleasant taste.

Prunus Amygdalus, J. Hooker. (*Amygdalus communis,* Linné.)

The Almond Tree. Countries around the Mediterranean Sea and Orient; really indigenous on the Anti-Lebanon, in Kurdestan, Turkestan, and perhaps on the Caucasus (Stewart). Both the sweet and bitter almond are derived from this species. Their uses and the value of the highly palatable oil obtained by pressure from them are well known. This oil can well be chosen as a means of providing a pleasant substitute for milk during sea voyages, etc., by mixing, when required, with it half its weight of powdered gum-arabic, and adding then successively, while quickly agitating in a stone mortar, about double the quantity of water. Thus a palatable and wholesome sort of cream for tea or coffee is obtained at any moment. Oil of apricot seeds is much used in India like almond oil. There exist hard and soft-shelled varieties of both the sweet and bitter almond. Almonds can even be grown on sea-shores. The crystalline amygdalin can best be prepared from bitter almonds, through removing the oil by pressure, then subjecting them to distillation with alcohol, and finally precipitating with ether. The volatile bitter almond-oil—a very dangerous substance—is obtained by aqueous distillation. Dissolved in alcohol it forms the essence of almonds. This can also be prepared from peach kernels.

Prunus Caroliniana, Aiton.

Southern States of North America. Porcher regards it as one of the most beautiful and manageable evergreens of those States. It can be cut into any shape and is much employed for quick and dense hedges. It can be grown on coast land.

Prunus Chisasa, Michaux.

North America, west of the Mississippi. On the prairies it is only 3 to 4 feet high. Fruit spherical, red, rather small, with a tender, usually agreeable pulp. Other species with edible fruit occur in North America, such as P. pumila, (L.), P. Pennsylvanica (L.), P. Virginiana (L.), P. serotina (Ehrh.), but their fruits are too small to render these plants of importance

for orchard culture, though they may also become enlarged by artificial treatment.

Prunus ilicifolia, Nuttall.

California. In deep rich soil, valuable for evergreen hedges of intricate growth. Fruit about ½ inch diameter, red or black, of a pleasant sub-acid flavour, but somewhat astringent (Gibbons).

Prunus Mahaleb, Linné.

Middle and South Europe. It deserves some attention on account of its scented seeds and also odorous wood, the latter used in turnery for pipes and other articles. The flowers are in use for perfumes.

Prunus maritima, Wangenheim.

The Beach Plum of North America. A shrubby species, of service, not only for covering coast-sands, but also for its fruit, which is crimson or purple, globular, and measuring from ½ to 1 inch. It is not necessary to enter here any notes on the generally known species of Prunus, which have engaged already for years the keen attention of many orchard cultivators. Cherry Tree bark contains 24 per cent. tannin, that of the Apricot tree 32 per cent. (Muspratt). Thus, we possess numerous varieties of the Cherry, P. avium (L.) and P. Cerasus (L.); of the Plum, P. domestica (L.); of the Apricot, P. Armeniaca (L.); and of the Cherry Plum, P. myrobalana (L.)—the latter Canadian, the others European and Oriental. Information on these and other varieties may be sought in "Hogg's Fruit Manual." The Almond (Amygdalus communis, L.) and the Peach (Amygdalus Persica, L.) belong also generically to Prunus, as indicated in 1812 by Stokes ("Bot. Mat. Med.," iii. 101) and in 1813 by F. G. Hayne ("Arzneï-Gewächse," iv. 38), and finally settled by J. D. Hooker (Benth. and Hook., gen. pl. i. 610), for which, therefore, now the names P. Amygdalus and P. Persica should be adopted. The latter came originally from China, while P. Armenica seems indigenous to the Caucasian regions and perhaps the Himalayas, and P. Cerasus originated from West Asia.

Prunus serotina, Ehrhart.

The Black Cherry Tree of North America. Fruit slightly bitter, but with a pleasant vinous flavour; wood valuable for cabinet and sash makers (A. Gray). In Virginia the tree attains a height of 100 feet, with a stem 4 feet in diameter; it prefers

rich porous soil in the upper parts of valleys. Wood pale red, dense, fine-grained; when polished, as beautiful as mahogany wood (Robb and Simmonds). It will live on the poorest soil, and even within the salt spray of the coast. Wood close-grained, compact, not liable to warp, easily worked and ebonized. Readily raised from seeds and transplanted; not succumbing under rough usage (Sargent).

Prunus spinosa, Linné.

The Sloe or Blackthorn. Wild in many parts of Europe. With its flowers it is one of the earliest plants to announce the spring. Its tendency to throw out suckers renders the bush less adapted for hedges of gardens than of fields, but these suckers furnish material for walking-sticks. The small fruits can be made into preserves. P. insititia (L.), the Bullace, with larger and sometimes yellow fruits, extends, as a variety, to North Africa and Middle Asia. Sir Joseph Hooker and other phytographers consider P. domestica not specifically distinct from P. spinosa. Of medical value are P. Lauro-Cerasus (L.), the evergreen Cherry-Laurel from the Orient, and P. Padus (L.), the deciduous Bird's Cherry, which extends from Europe to North Africa and West Asia. These and most other species contain in their foliage and in some other parts amygdalin. Perhaps some of the species from Eastern Asia, California, and tropical America are eligible for improving their fruit through horticultural skill. The Sloe and others might with advantage be naturalised on forest streams.

Prunus Virginiana, Linné.

The Choke Cherry Tree of the United States. In a mild clime and fertile soil this tree attains a height of 100 feet and a stem of 16 feet in circumference. The wood is compact, fine-grained, and not liable to warp when perfectly seasoned, of a dull, light-red tint, deepening with age. The fruit finally loses its austerity.

Psamma arenaria, Roemer and Schultes. (*P. littoralis,* Beauvois; *Calamagrostis arenaria,* Roth.)

The Moram, or Marrem, or Bent Grass. Sand-coasts of Europe, North Africa, and Middle North America. One of the most important of reedy grasses, with long descending roots, for binding moving drift-sands on the sea-shore, for the consolidation of which in Europe chiefly this tall grass and Llymus arenarius are employed. It delights in the worst of drift-sands, and for its full flourishing gradual accumulation of fresh sand around it becomes necessary (Wessely): hence it never

gets suffocated. The plant will by gradual up-growth finally form stems and roots sanded into a depth of fully 100 feet. Psamma Baltica (R. and S.), from the Baltic and North Seas, serves the same purpose. Both can also be used in the manner of Sparta for paper material, for tyeing and for mats. Like Elymus arenarius, it is not touched by grazing-animals. It collects the sand-heaps at the tops of ridges, while the Elymus fastens their sides.

Psidium acidum, Martius.

Higher regions on the Amazon River. A tree 30 feet high; its Guava-fruit pale yellow and of apple size.

Psidium Araca, Raddi.

From West India and Guiana to Peru and Southern Brazil, where it is found in dry high-lying places. This is one of the edible Guavas, recorded already by Piso and Marcgrav. The greenish-yellow berry is of exquisite taste.

Psidium arboreum, Vellozo.

Brazil; province Rio de Janeiro. This Guava-fruit measures about one inch, and is of excellent flavour.

Psidium Cattleyanum, Sabine.*

The Purple Guava. Brazil and Uruguay. One of the hardiest of the Guava-bushes, attaining finally a height of 20 feet. The purple berries are seldom above an inch long, but of delicious flavour and taste, resembling thus far strawberries. P. buxifolium (Nutt.), of Florida, seems nearly related to this species.

Psidium chrysophyllum, F. v. Mueller. (*Abbevillea chrysophylla,* Berg.)

The Guabiroba Do Mato of South Brazil. This tree attains also a height of about 30 feet. The fruit generally not larger than a cherry. Perhaps other species of the section Abbevillea would be hardy and worthy of cultivation.

Psidium cinereum, Martius.

Brazil; provinces Minas Geraes and Sao Paulo. Also yielding an edible fruit.

Psidium cordatum, Sims.

The Spice Guava. West India. This one attains the height of a tree. Its fruit edible.

Psidium cuneatum, Cambessedes.

Brazil; province Minas Geraes. Fruit greenish, of the size of a Mirabelle Plum.

Psidium grandifolium, Martius.

Brazil; provinces Rio Grande do Sul, Parana, Sao Paulo, Minas Geraes, where the climate is similar to Southern Queensland. A shrub of rather dwarf growth. The berries edible, size of a walnut.

Psidium Guayava, Raddi.* (*P. pomiferum*, Linné; *P. pyriferum*, Linné.)

The large Yellow Guava. From West India and Mexico to South Brazil. For this handsome evergreen and useful bush universal attention should be secured anywhere in warm low-lands, for the sake of its aromatic wholesome berries, which will attain the size of a hen's egg and can be converted into a delicious jelly. The pulp is generally cream-coloured or reddish, but varies in the many varieties which have arisen in culture, some of them bearing all the year round. Propagation is easy from suckers, cuttings, or seeds. Many other berry-bearing Myrtaceæ (of the genera Psidium, Myrtus, Myrcia, Marliera, Calyptranthes, Eugenia) furnish edible fruits in Brazil and other tropical countries, but we are not aware of their degrees of hardiness. Berg enumerates as esculent more than half a hundred for Brazil alone, of which the species of Campomanesia may safely be transferred to Psidium.

Psidium incanescens, Martius.

Brazil, from Minas Geraes to Rio Grande do Sul. This Guava-bush attains a height of 8 feet. Berry edible.

Psidium lineatifolium, Persoon.

Mountains of Brazil. Berry about one inch diameter.

Psidium malifolium, F. v. Mueller. (*Campomanesia malefolia*, Berg.)

Uruguay. Berry about one inch diameter.

Psidium polycarpon, Al. Anderson.*

From Guiana to Brazil, also in Trinidad. A comparatively small shrub, bearing prolifically and almost continuously its yellow berries, which are of the size of a large cherry and of exquisite taste.

Psidium rufum, Martius.

Brazil, in the province of Minas Geraes, on Sub-Alpine heights. This Guava-bush gains finally a height of 10 feet, and is likely the hardiest of all the species producing palatable fruit.

Psoralea esculenta, Pursch.

North America. This herb is mentioned here, as the tuberous roots known as Prairie Turnips may by cultural processes be capable of great improvement, and of thus becoming a valuable esculent.

Psychotria Eckloniana, F. v. Mueller. (*Grumilia cymosa,* E. Meyer.)

South Africa. Dr. Pappé describes the wood of this tree as beautifully citron-yellow.

Pterocarpus Indicus, Roxburgh.

The Lingo of China and India. A tree of considerable dimensions, famed for its flame-red wood. It furnishes also a kind of dragon-blood resin.

Pterocarpus Marsupium, Roxburgh.

India, ascending in Ceylon and the Circars to at least 3,000 feet altitude; hence this tree would doubtless grow without protection in those tracts of the temperate zone which are free from frost. It exudes the best medicinal kino, which contains about 75 per cent. of tannic acid. The foliage is deciduous. P. santalinus (Linné fil.), which provides the Saunders or Red Sandal Wood, is also indigenous to the mountains of India.

Pterocarya fraxinifolia, Kunth.

From Central Asiatic Russia to Persia. A kind of Walnut Tree, which, with P. stenoptera (Cas. de Cand.), on Dr. Hance's recommendation, should be adopted as trees for both ornament and timber, and so perhaps also the Japanese species.

Ptychosperma Alexandræ, F. v. Mueller.

The Alexandra Palm. Queensland, as well in tropical as extra-tropical latitudes. The tallest of Australian Palms, and one of the noblest forms in the whole empire of vegetation. It exceeds 100 feet in height, and is likely destined to grace any shady moist grove free from frost, as it seems less tender than most palms. The demand for seeds has already been enormous.

Ptychosperma Arfakiana, Beccari.

New Guinea, reaching elevations of 5,000 feet in comparatively temperate regions. Height up to 30 feet.

Ptychosperma Cunninghami, Hermann Wendland.

East Australia, as far south as Illawarra; thus one of the most southern of all Palms. This also is a very high species, destined to take a prominent position in decorative plantations. Several species occur in Fiji and other islands of the Pacific Ocean, and others again might be obtained from India, but they are probably not so hardy as those mentioned. Though strictly speaking of no industrial value, these Palms are important for horticultural trade, and are objects eminently fitted for experiments in acclimatisation.

Ptychosperma disticha, Miquel. (*Areca disticha,* Griffith.)

Assam, up to 4,000 feet.

Ptychosperma elegans, Blume. (*P. Seaforthia,* Miquel; *Seaforthia elegans,* R. Brown.

Littoral forests of tropical Australia. Also a lofty magnificent Feather-Palm. Its leaflets are erose. It may prove hardy.

Ptychosperma Musschenbroekiana, Beccari.

Ternate, up to 3,000 feet. Height of this palm 90 feet. Almost sure to be hardy in sheltered localities of the warmer temperate zone.

Pueraria tuberosa, Candolle.

South Asia, up to 4,000 feet. A tall woody twiner. Its large tubers are edible and might improve by culture.

Pugionium cornutum, Gaertner.

From the Caspian Sea to China. This herb is grown by the Mongols as a vegetable (Hance).

Punica granatum, Linné.

The Pomegranate. North Africa and West Asia, in the Himalayas up to 6,000 feet. Well-known for its showy habit, rich-coloured flowers, peculiar fruit, and medicinal astringency but much overlooked regarding its value as a hedge-plant. The bark contains 32 per cent. tannin (Muspratt).

Pycnanthemum incanum, Michaux.

North America. A perennial herb, in odour resembling both

Penny-royal and Spearmint. It likes to grow on rocky woodland, and on such it might be easily naturalised.

Pycnanthemum montanum, Michaux.

The Mountain Mint of North America. A perennial herb of pleasant, aromatic, mint-like taste. These two particular species have been chosen from several North American kinds to demonstrate that we may add by their introduction to the variety of our odorous garden-herbs. They may also be subjected with advantage to distillation.

Pyrularia edulis, Meissner.

Nepal, Khasia, Sikkim. A large umbrageous tree. The drupaceous fruit is used by the inhabitants for food. A few other species occur in Upper India, one on the high mountains of Ceylon and one in North America. The latter, P. pubera (Mich.), can be utilised for the oil of its nuts.

Pyrus coronaria, Linné.

The Crab Apple of North America. This showy species is mentioned here as worthy of trial culture, since it is likely that it would serve well as stock for grafting. Best grown in glades. Wood nearly as tough for screw-work as that of the Pear Tree (Robb). It seems unnecessary to refer here to any of the forms of Pyrus communis (L.), P. Malus (L.), P. Cydonia (L.), and P. Germanica (J. Hooker), (Mespilus Germanica, L.), but it may passingly be observed that curious fruits have been produced latterly in North America in the hybridisation of the Apple with the Pear. Pearwood is one of the best substitutes for boxwood in xylography. Pyrus communis attains an age of over 300 years, fully bearing. Trees are known to have attained a circumference of 10 feet at 3 feet from the ground. At Garmouth a tree over 100 years old has borne up to 26,800 fruits annually, and in some years more. The circumference of its frond is 126 feet (Masters). A bitter glycosid—namely, Phlorrhizin—is obtainable from the bark of apple and pear trees, particularly from that of the root; while a volatile alkaloid—namely, trimethylamin—can be prepared from the flowers.

Pyrus Japonica, Thunberg.

Japan. One of the prettiest of small hedge-bushes. Under favourable circumstances it will produce its quince-like fruit.

Pyrus nivalis, Jacquin.

The Snow Pear. Middle and South Europe. This would be

adapted for orchards in higher mountain regions. The fruit becomes soft and edible through exposure to snow. P. amygdaliformis (Villars) is probably the wild state of this tree.

Pyrus salicifolia, Linné.

Greece, Turkey, Persia, South-West Russia. Though its fruit, which slowly mollifies, is edible, this tree is mainly utilised as a superior stock for grafting.

Quercus Ægilops, Linné.

South Europe, also Syria. A nearly evergreen tree of the size of the British Oak. The cups, known as Valonia, used for tanning and dyeing; the unripe acorns, as Camata or Camatena, for the same purpose. Valonia is mainly exported from Smyrna to London (33,802 tons in 1876). Greece used to produce annually 10,000 tons, worth up to £18 per ton. Valonia (Wallones) produces a rich bloom on leather, which latter becomes also less permeable to water (Muspratt). The ripe acorns are eaten raw or boiled. The tree is also recommendable as a fine avenue tree. The wood is capital for furniture.

Quercus agrifolia, Nee.

California and Mexico. One of the most magnificent among evergreen Oaks, with dense, wide-spreading foliage. The thick bark available for tanning (C. Hoffmann). According to Dr. Gibbons this tree attains a height of 100 feet, a stem of 8 feet, and a crown 125 feet in diameter. Wood-cutters distinguish two varieties, one with red and one with white wood. It grows near the sea, and luxuriates in deep soil of valleys and also on the tops of mountains. The value of its timber is not fully appreciated. Although brittle when green and perishable if exposed to the weather, it becomes almost as hard and strong as Live Oak if properly seasoned, and is especially adapted for ships' knees.

Quercus alba, Linné.*

The White or Quebec Oak. A most valuable timber tree, 100 feet high; diameter of stem 7 feet. Trunk sometimes 65 feet long to first branch. This tree attains a great age; succeeds best in rich woodlands; and is of quicker growth than the English Oak. The timber is pliable, most durable, one of the very best of all woods for casks, also of first class value for cabinet-work, for machinery, spokes, naves, railway ties (Robb); it is also employed in ship-building; the young

saplings serve for hoofs and whip-handles. The bark contains about 8 per cent. tannin (Gard. Chron.).

Quercus annulata, Smith.

A large evergreen Oak of Nepal, which provides a very good timber. It does not ascend quite so high as Q. incana. Q. spicata (Smith), another very large Himalayan Oak, ascends only to 5,000 feet; it is known also from Borneo, Java, and Sumatra.

Quercus aquatica, Walter.

North America. Height of tree, 60 feet; it furnishes a superior bark for tanning, also wood for ship-building. This Oak should be chosen for planting in wet ground or for bordering streams.

Quercus Castanea, Nee.

The Mexican Chestnut Oak. It furnishes edible acorns.

Quercus Cerris, Linné.

South Europe, South-West Asia. Turkey or Mossy-cupped Oak. Of the height of the English Oak, in suitable localities, of quick growth. The foliage deciduous, or also evergreen. The wood available for wheelwrights, cabinet-makers, turners, coopers; also for building purposes. Structure of the wood similar to that of the British Oak; the sapwood larger, the heartwood of a more saturated brown, and the large rays more numerous, giving it a most varied and beautiful wainscot grain (Brandis).

Quercus Chinensis, Bunge.

North China. One of the hardiest among the evergreen Oaks.

Quercus chrysolepis, Liebmann.

California. According to Vasey this evergreen Oak rarely exceeds 50 feet in height, but supplies the hardest oak-wood on the Pacific coast. Dr. Gibbons observes that it holds a primary rank among Californian forest trees, but is of sparse occurrence; in suitable soil on the sides of mountains it is of giant growth, spreading out in magnificent proportions. In toughness and density of wood it represents the Live Oak of Florida.

Quercus coccifera, Linné.

The deciduous Kermes Oak of South Europe, North Africa

and South-West Asia. So called from the red dye furnished by the Coccus ilicis from this Oak. It also supplies tanners' bark containing about 8 per cent. tannin (Muspratt). The huge and ancient Abraham's Oak belongs to this species. The tree likes rich woods.

Quercus coccinea, Wangenheim.

The Black Oak of North America. Height 100 feet; stem diameter 5 feet. Foliage deciduous. The yellow dye known as quercitron comes from this tree. It is much more powerful than that of Woad (Bancroft). With alumina the tinge of the bark is bright yellow, with oxyde of tin it is orange, with oxyde of iron it is drab (Porcher). Q. tinctoria (Bartram) is a variety. The bark of the variety called Scarlet Oak is practically far inferior in value to that of the Black Oak (Meehan). Bark rich in tannic acid, about 8 per cent. (Gard. Chron.). Dr. Engelmann found the Black Oaks twice as fast in growth as the White Oaks of the United States. The Bartram's Oak (Q. heterophylla) is according to him a hybrid between the Willow Oak and Scarlet Oak. Hybrid Oaks produce acorns fit to germinate.

Quercus cornea, Loureiro.

China. An evergreen tree, 40 feet high. Acorns used for food.

Quercus cuspidata, Thunberg.*

Japan. The acorns, when boiled or roasted, are edible and regularly sold in Japan for food (Rein). A magnificent Oak, grand in its proportion, bears acorns in bunches or strings, of very sweet taste when baked like chestnuts, but only of the size of kidney beans (F. C. Christy).

Quercus densiflora, Hooker and Arnott.

Californian Chestnut Oak. A large evergreen tree of beautiful outline, dense foliage and compact growth. Bark very valuable for tanning; wood, however, subject to rapid decay (Prof. Bolander). Quercus Douglasii is another tall Oak of California.

Quercus dentata, Thunberg.*

Japan. This is one of the species on which the Oak Silkworm (the Yama Mayon) lives.

Quercus dilatata, Lindley.

From the Himalayas to Afghanistan, at elevations from 4,500

to 10,000 feet. Height up to 100 feet; crown very shady, lopped for sheep fodder. The hard, heavy, and durable wood much used for building purposes and implements (Madden).

Quercus falcata, Michaux.

North America. A tree attaining a height of 80 feet, with a stem 4 feet in diameter. Foliage deciduous. It lives in dry sandy ground, and can also be utilised for sea-coasts. Produces an excellent tanners' bark and also galls for superior ink.

Quercus Garyana, Douglas.

North-West America, along the coast between the 38th and 50th degrees. A gigantic tree, 100 feet high or more, with a stem 6 feet in diameter. This, with Q. Douglasii (Hook. and Arn.) and Q. lobata, passes as Californian White Oak. The timber is remarkably pale for an Oak, hard and fine-gained, of great strength and durability, well suited for almost every kind of construction for which the White or the European Oak is employed. The acorns, being sweet and agreeable, form an excellent mast for hogs.

Quercus glauca, Thunberg.

The Kashi of Japan. A large and truly magnificent evergreen tree, 80 feet high. The hard and close-grained wood is chosen there for select tools, particularly planes and utensils (Christy).

Quercus Ilex, Linné.

The Holly Oak of South Europe; extending also to Algeria and to the Himalayas, which it ascends up to about 10,000 feet. Height of tree 50 feet. Wood in use for ship-building, bark for tanning. From varieties of this tree are obtained the sweet and nourishing Ballota and Chestnut acorns.

Quercus incana, Roxburgh.

Himalayas, at elevations between 3,000 and 8,000 feet. A beautiful evergreen tree of great dimensions. Mr. Simmonds reminds us that a silkworm (Antheraea Roylei), producing large cocoons, lives on this Oak. In its native localities Q. lanuginosa (D. Don) is associated with it. Q. lamellosa (Smith), of the same region, attains a height of 120 feet, with a straight trunk of 60 feet and 15 feet in girth (Brandis).

Quercus infectoria, Oliver.

Around the Mediterranean Sea. Only a small tree, with deciduous foliage. Chiefly from this tree the galls of com-

merce are obtained. A variety, Q. Lusitanica (Webb), or Q. Mirbeckii (Durieu), attains a height of 120 feet, with a stem girth of 20 feet. Some states of this are almost evergreen.

Quercus lancifolia, Roxburgh.

A tall timber tree of the Himalayas. Wood valued for its durability.

Quercus lobata, Nee.

California. The Sacramento White Oak. Up to 150 feet high and 6 feet in diameter, with wide-spreading branches. The wood is brittle when green, but hard and tough when seasoned; its value has been much underrated (Gibbons). The acorns of this Oak used to form a large proportion of the winter food of the aboriginal inhabitants of North California.

Quercus lyrata, Walter.

The Overcup Oak of the South-Eastern States of North America, extending from South Illinois to Florida and Louisiana. A tree of majestic size, 80 feet high, with a stem 4 feet in diameter. Lately recommended as one of the most valuable for timber cultivation, especially for wet ground.

Quercus macrocarpa, Michaux.*

The Bur Oak of North America. Tree 70 feet high. The timber nearly as good as that of the White Oak. The bark contains about 8 per cent. tannin.

Quercus macrolepis, Kotschy.*

Greece. This Oak yields also Valonia, being closely allied to Q. ægilops.

Quercus Mongolica, Fischer.*

Manchuria. It is on this tree and on Q. serrata (Thunberg) that the silk-insect peculiar to Oak trees mainly, if not solely, is reared, as shown by Dr. Hance.

Quercus palustris, Du Roi.

The Pin Oak or Marsh Oak of North America. Height 80 feet; of quick growth. The wood, though not fine-grained, is strong and tough.

Quercus Phellos, Linné.

The Willow Oak of the Eastern States of North America,

The acorns available for food, like those of several other species,—for instance, Q. glabra (Thunb.) of Japan. The comparative value of the very numerous Cis- and Trans-Atlantic Oaks, but little as yet understood either for avenue purposes or timber plantations, should be tested with care in botanic gardens. Even recently Oaks have been discovered on the mountains of New Guinea.

Quercus Pinus, Linné.

The North American Swamp Oak. A tree 90 feet high, available for wet localities. Foliage deciduous, Wood strong and elastic, of fine grain; according to Porcher it is easy to split and not hard. A red dye is produced from the bark.

Quercus Robur, Linné.*

The British Oak. Extending through a great part of Europe and Western Asia, attaining a great age and an enormous size. Extreme height 120 feet. Two varieties are distinguished: 1, Q. sessiliflora (Salisbury). The Durmast-Oak, with a darker, heavier timber, more elastic, less fissile, easier to bend under steam. This tree is also the quickest of the two in growth, and lives on poorer soil. Its bark is also richer in medicinal, dyeing, and tanning principles. 2, Q. pedunculata (Ehrh.). This variety supplies most of the oak timber in Britain for ship-building, and is the best for cabinet-makers' and joiners' work. In Britain it is attacked by Scolytus multistriatus. The long-continued adherence of dead leaves in the cool and most verdant season renders this Oak not so well adapted for pleasure-grounds in the warmer parts of the temperate zone as many other, particularly evergreen Oaks.

Quercus rubra, Linné.

The Red Oak of North America. Height 100 feet; diameter of stem 4 feet. The wood is not of value, but the bark is rich in tannin. Autumnal tint of foliage beautifully red. The acorns, which are produced in great abundance, are relished by animals.

Quercus semecarpafolia, Smith.

In the Himalayas, up to 10,000 feet. The largest of the Oaks of India, upwards of 100 feet high, with a stem up to 18 feet in girth. Leafless for a short time. It furnishes a hard and heavy timber of fair quality.

Quercus serrata, Thunberg.

One of the twenty-three known Japan Oaks; extending to

China and Nepal. A good avenue-tree, though deciduous. It yields the best food for the Oak Silkworm (Bombyx Yamamai).

Quercus Sideroxylon, Humboldt.

Mountains of Mexico, at 8,000 feet elevation. An Oak of great size, of compact timber, almost imperishable in water. Q. lanceolata, Q. chrysophylla, Q. reticulata, Q. laurina, Q. obtusata, Q. glaucescens, Q. Xalapensis (Humb.), and Q. acutifolia (Nee) are among the many other highly important timber Oaks of the cooler regions of Mexico. No printed records seem extant concerning the technology of the numerous Mexican Oaks, though doubtless their respective values are well known to local artisans. According to the abbé and surgeon Liturgie, one of the Mexican Oaks near San Juan nourishes a Bombyx the cocoons of which are spun by the natives into silk (Tschichatchef).

Quercus Skinneri, Bentham.

Mexico. The acorns of this Oak measure nearly 6 inches in circumference, and are available for various domestic animals.

Quercus squamata, Roxburgh.

One of the tallest of the Himalayan Oaks. Wood lasting.

Quercus stellata, Wangenheim.

The Post Oak of North-East America. Content with poor and even sandy soil, but not a large tree. For its very durable and dense wood it is much in requisition there for posts, and is particularly highly prized for ship-building.

Quercus Suber, Linné.

The Cork Oak of South Europe and North Africa; evergreen. It attains an age of fully two hundred years. After about twenty years it can be stripped of its bark every six or seven years; but the best cork is obtained from trees over forty years old. Height of tree about 40 feet. Acorns of sweetish taste. Mr. Robinson found that young Cork Oaks obtained from the writer made a growth of 4 feet in a year in the humid Western Port district of Victoria. The bark of Q. pseudo-suber (Sant.) is inferior for cork, but the closely-allied Q. occidentalis (Gay), which is hardier than Q. Suber, produces a superior cork-bark.

Quercus Sundaica, Blume.

One of the Oaks from the mountains of Java, where several other valuable timber Oaks exist. The existence of Oaks on the higher mountains of New Guinea has been demonstrated by Dr. Beccari; hence, in all probability, additional valuable evergreen species will be obtainable for our arboreta from thence.

Quercus Toza, Bosc.

South Europe. One of the handsomest Oaks, and one of the quickest of growth. Will live in sandy soil. It furnishes superior tanners' bark.

Quercus virens, Linné.*

The Live Oak of North America, extending northward to Virginia, and perhaps the hardiest of the evergreen species. Fifty feet high, with a stem of sometimes 9 feet in diameter. Supplies a most valuable timber for ship-building; it is heavy, compact, fine-grained; it is, moreover, the strongest and most durable of all American Oaks. Like Q. obtusiloba (Mich.), it lives also on sea-shores, helping to bind the sand, but it is then not of tall stature. Of many of the three hundred Oaks of both the western and eastern portions of the northern hemisphere, the properties remain unrecorded and perhaps unexamined; but it would be important to introduce as many kinds as possible for local test-growth. The acorns, when packed in dry moss, retain their vitality for some months. The species with deciduous foliage are not desirable for massive ornamental planting in the warmer parts of the temperate zone, because they shed their dead leaves tardily during the very time of the greatest verdure of other vegetation.

Quillaja saponaria, Molina.

Chili. A colossal tree. The bark is rich in saponin, and thus valuable for dressing wool and silk.

Rafnia amplexicaulis, Thunberg.

South Africa. The root of this bush is sweet like liquorice, and is administered in medicine. Rafnia perfoliata (E. Meyer), also from South Africa, furnishes likewise a medicinal root.

Raphanus sativus, Linné.

South Asia, up to 16,000 feet in the Himalayas, eastward to Japan. The Radish. R. caudatus (L.), the Radish with long

edible pods, is regarded by Dr. Th. Anderson as a mere variety, and he thinks that all are sprung from the ordinary R. Raphanistrum (L.) of Europe. All Radishes succeed best in a calcareous soil, or aided by manure rich in lime. The root of the Black Radish is comparatively rich in starch.

Remirea maritima, Aublet.

Intratropical coast regions around the globe. A perennial creeper for binding sand.

Reseda Luteola, Linné.

The Weld. Middle and South Europe, Middle Asia, North Africa. A herb of one or two years' duration. Likes calcareous soil. A yellow dye (luteolin) pervades the whole plant. The plant must be cut before the fruit commences to develop, otherwise the pigment will much diminish.

Reseda odorata, Linné.

The true Mignonette. North Africa and Syria. A herb of one or very few years' duration. The delicate scent can best be concentrated and removed by enfleurage.

Rhagodia Billardieri, R. Brown.

Extra-tropical Australia. An important bush for binding moving sand on sea-shores. A herb of this Order, Atriplex crystallinum (J. Hooker), should be encouraged in its growth at the very edge of tides or sand-shores, where with Cakile maritima, Mesembrianthemum australe, and M. æquilaterale, it will form one of the most effectual first impediments to the influx of sea-sand.

Rhamnus catharticus, Linné.

The Buckthorn. Middle and South Europe, North Africa, Middle Asia. It can be utilised as a hedge-plant. The berries are of medicinal value, as indicated by the specific name. The foliage and bark can be employed for the preparation of a green dye.

Rhamnus chlorophorus, Lindley.

China. From the bark a superior green pigment is prepared. R. utilis, from the same country, serves for the like purpose. This kind of dye is particularly used for silk, and is known as Lokao.

Rhamnus frangula, Linné.

• Europe, North Africa, North and Middle Asia. One of the very best woods for gunpowder. Recommended by Sir Joseph Hooker to be grown on the coppice system for this purpose.

Rhamnus Græcus, Reuter.

Greece. From this shrub, and to no less extent from the allied R. prunifolius (Sibth.), are the green dye-berries collected in Greece, according to Dr. Heldreich. These shrubs grow on stony mountains up to 2,500 feet.

Rhamnus infectorius, Linné.

On the Mediterranean Sea and in the countries near to it. The berry-like fruits of this shrub are known in commerce as Graines d'Avignon and Graines de Perse, and produce a valuable green dye. Other species seem to supply a similar dye-material,—for instance, R. saxatilis (L.), R. amygdalinus (Desf.), R. oleoides (L.), R. tinctorius (W. and K.).

Rhapidophyllum hystrix, Wendland and Drude. (*Chamærops hystrix,* Fraser).

The Bule Palmetto of Florida and Carolina. Another hardy dwarf Fan Palm.

Rhapis flabelliformis, Linné fil.

China and Japan. This exceedingly slender Palm attains only a height of a few feet. The stems can be used for various small implements. It is one of the best plants for table decoration.

Rhaponticum acaule, Candolle. (*Centaura Cynara,* F. v. M.)

On the Mediterranean Sea. A perennial herb. The root is edible.

Rheum australe, Don.* (*R. Emodi,* Wall.; *R. Webbianum,* Royle.)

Himalayan regions up to 16,000 feet. From this species at least a portion of the medicinal Rhubarb is obtained; most likely several species furnish Rhubarb-root, and its quality depends probably much on the climatic region and the geological formation in which the plant grows. Should we wish to cultivate any species here for superior medicinal roots, then clearly localities in our higher and drier Alpine tracts should be chosen for the purpose. Hayne regards the presence of much yellowish pigment in the seed-shell as indicating a good medicinal Rhubarb-plant. As much as five lbs. of the

dried drug are obtained from a single plant several years old. An important orange-red crystalline substance, emodin, allied to chrysophanic acid, occurs in genuine Rhubarb. A large proportion of the medicinal Rhubarb-root is now grown in England.

Rheum officinale, Baillon.*

Western China and Eastern Thibet on the high table-land. It furnishes the most of the true Turkey Rhubarb, not merely from the root, but also from the woody stem. Suited for mountainous regions. Recommended also as a scenic plant by Regel.

Rheum palmatum, Linné.*

From insular to Alpine North-Eastern Asia. A variety from the Tangut country of Mongolia or North Thibet yields an excellent medicinal root known as the Kiakhta or Khansu Rhubarb (Maximowicz); valuable also as a decorative plant.

Rheum Rhaponticum, Linné.

From the Volga to Central Asia. This species, together with R. Tataricum (L. fil.), R. undulatum (L.), and a few others, all Asiatic (one extending to Japan), provide their acidulous leaf-stalks and unexpanded flower-mass for culinary purposes. Rhubarb-leaves can also be used in the manner of Spinage.

Rhizopogon magnatum, Corda.

Europe. One of the edible truffles sold in the markets of Middle Europe, with *R. rubescens*, Tul.

Rhododendron maximum, Linné.

North-East America. Attains a height of 20 feet. Irrespective of its being a fine acquisition for any garden copses, this bush seems of industrial importance, because Mr. C. Forster asserts that the wood of this and the allied Kalmia latifolia (L.) is equalled only by the best boxwood. This may give a clue to other substitutes for that scarce commodity, needed so extensively by the wood-engraver.

Rhus caustica, Hooker and Arnott.

Chili, where it is called the Litre. A small or middle-sized tree, the very hard wood of which is used for wheel-teeth, axletrees, and select furniture. The plant seems neither caustic nor otherwise poisonous (Dr. Philippi).

Rhus copallina, Linné.

North America, extending to Canada. A comparatively dwarf species. This can be used for tanning. A resin for varnishes is also obtained from this shrub.

Rhus coriaria, Linné.*

The Tanner's Sumach. Countries around the Mediterranean Sea. The foliage of this shrub or small tree, reduced to powder, forms the Sumach of commerce. It is remarkably rich in tannic acid, yielding as much as 30 per cent., and is extensively used for the production of a superior Corduan- or Maraquin-leather and pale-coloured leathers and dress goods. Sumach allows the leather to carry more grease (Ballinent). Price in Melbourne £36 per ton. The cultivation presents no difficulty. It thrives best in loose calcareous soils and cannot endure stagnant water. The strongest Sumach is produced on dry ground. A gathering can be obtained from suckers in the first year. The duration of Sumach fields under manure extends to fifteen years. Sumach can also be used for ink and various, particularly black, dyes. Under favourable circumstances as much as a ton of Sumach is obtained from an acre.

Rhus cotinus, Linné.

The Scotino. Countries of the Mediterranean Sea, extending to the Himalayas. The wood of this bush furnishes a yellow pigment. The Scotino, so invaluable as a material for yellow and black dye, and as a superior tanning substance, consists of the ground foliage of this plant. It contains up to 24 per cent. tannin.

Rhus glabra, Linné.

North America, extending to 54° north latitude. This Sumach shrub will grow on rocky and sterile soil. It produces a kind of gall, and can also be used as a good substitute for the ordinary Sumach. This species can be easily multiplied from suckers. It will live on poor soil. American Sumachs contain generally from 15 to 20 per cent. tannin or occasionally up to 26 per cent. tannin.

Rhus lucida, Linné.

South Africa. This shrub proved in Victoria of particular adaptability for forming hedges; it is evergreen, close growing, and stands clipping well. About half a hundred South African species are known, of which probably some could be utilised like ordinary Sumach, but hitherto we have remained

unacquainted with the nature and degree of any of their tanning and colouring principles.

Rhus semialata, Murray.

China and Japan, extending to the Himalayas. Attains a height of 40 feet. This shrub produces a kind of nutgalls.

Rhus succedanea, Linné.

The Japan Wax Tree, the produce of which has found its way into the English market.

Rhus typhina, Linné.

The Staghorn Sumach. North America, extending to Canada. This species will grow to a tree of 30 feet high. Its wood is of an orange tinge. Through incisions into the bark a kind of Copal is obtained. The leaves can be used like ordinary Sumach. This bush can be reared on inferior land. The leaves of American Sumach must be collected early in the season if a clear white leather like that from Sicilian Sumach is to be obtained. This can be ascertained by the colour of the precipitate made with gelatine.

Rhus vernicifera, Candolle.

Extends from Nepal to Japan. It forms a tree of fair size, and yields the Japan varnish. It ascends in India to 7,000 feet, but Stewart and Brandis are doubtful whether the Japan species (R. Vernix, L.) is really identical with the Indian.

Ribes aureum, Pursh.

Arkansas, Missouri, Oregon. This favourite bush of our shrubberies would likely in our forest streams produce its pleasant berries, which turn from yellow to brown or black. Professor Meehan mentions a variety or allied species from Utah, with berries larger than those of the black currant; they are quite a good table-fruit, and of all shades from orange to black. Allied to this is R. tenuiflorum (Lindl.), of California and the nearest States, with fruits of the size of red currants, of agreeable flavour, and either dark purple or yellow colour. R. aureum, R. palmatum, and some other strong American species have come into use for grafting on them the European Gooseberry (C. Pohl.)

Ribes Cynosbati, Linné.

The Prickly-fruited Gooseberry of Canada and the Northern

States of the American Union. The berries are large. There is a variety, not so objectionably burrlike-prickly. R. Cynosbati has been hybridised with R. Grossularia, and the sequence has been a good result (Saunders).

Ribes divaricatum, Douglas.

California and Oregon. One of the Gooseberries of those countries. Berries smooth, black, about one-third of an inch in diameter, pleasant to the taste. Culture might improve this and many of the other species. R. Nuttalli (R. villosum, Nutt., not of Gay nor of Wallich) is an allied plant, also from California.

Ribes floridum, L'Heritier.

The Black Currant of North America. The berries resemble in odour and taste those of R. nigrum. Allied to this is R. Hudsonianum (Rich.) from the colder parts of North America.

Ribes Griffithi, J. Hooker and T. Thomson.

Himalaya, at the height of 10,000 to 13,000 feet. Allied to R. rubrum, bearing similar but larger berries of somewhat austere taste. R. laciniatum (H. and T.) is likewise a Himalayan species with red berries, and so is R. glaciale (Wall.). Furthermore, R. villosum, Wall. (R. leptostachyum, Decaisne), comes from the Indian highlands and seems worthy of notice.

Ribes Grossularia, Linné.

The ordinary Gooseberry. Europe, North Africa, Western Asia, on the Himalayan mountains up to a height of 12,000 feet. This bush, familiar to every one, is mentioned here merely to indicate the desirability of naturalising it in any Alpine regions where it is not indigenous.

Ribes hirtellum, Michaux.

The commonest smooth Gooseberry of North America, particularly in the New England States. It likes moist ground.

Ribes nigrum, Linné.

The Black Currant. Middle and Northern Asia, Europe, North America, ascending the Himalayan and Thibet mountains to a height of 12,000 feet; also particularly fit to be dispersed through forests in elevated situations.

Ribes niveum, Lindl.

One of the Oregon Gooseberry-bushes. Berries small, black, of a somewhat acid taste and rich vinous flavour.

Ribes rotundifolium, Michaux.

North America, as far as Canada. Yields part of the smooth Gooseberries of the United States. The fruit is small, but of delicious taste. Unlike the ordinary Gooseberry, not subject to mildew. Careful cultivation has advanced gradually the size of the fruit (Meehan).

Ribes rubrum, Linné.

The ordinary Red Currant. Europe, North America, North and Middle Asia, in the Himalayan Mountains ceasing where R. Griffithi commences to appear. One of the best fruit-plants for jellies and preserves that could be chosen for colder mountain altitudes. The root-bark contains phlorrhizin. Perhaps other species than those recorded here, among them some from the Andes, may yet deserve introduction, irrespective of their showiness, for their fruits.

Richardia Africana, Kunth. (*R. Aethiopica,* Rosenthal.)

From the Nile to the Cape of Good Hope. Important for scenic effects, particularly on the margins of waters. Easily moved at all seasons. The fresh root contains about 2 per cent. of starch.

Ricinus communis, Linné.*

The Castor Oil Plant. Indigenous to the tropical and subtropical zones of Asia and Africa. A shrubby, very decorative plant, attaining the size of a small tree. It was well known to the Egyptians four thousand years ago, and is also mentioned in the writings of Herodotus, Hippocrates, Dioscorides, Theophrastos, Plinius, and other ancient physicians, philosophers, and naturalists. The easy and rapid growth, the copious seeding, and the early return of produce render this important plant of high value in the warm temperate zone, more particularly as it will thrive on almost any soil, and can thus be raised even on arid places, without being scorched by hot winds. It may thus become an important plant also for culture in desert-tracts, and is evidently destined to be one of the most eligible oil-plants for technical uses, particularly for lubricating machinery, irrespective of the value of its oil for medicinal purposes. The seeds contain about 50 per cent. oil. To obtain the best medicinal oil,

hydraulic pressure should be employed, and the seeds not be subjected to heat; the seed-coat should also be removed prior to the extracting process being proceeded with. A screw-press suffices, however, for ordinary supply to obtain the oil. By decantation and some process of filtration it is purified. For obtaining oil to be used for lubrication of machinery or other technological purposes, the seeds may be pressed and prepared by various methods under application of heat and access of water. Castor oil is usually bleached simply by exposure to solar light, but this procedure lessens to some extent the laxative properties of the oil. It dissolves completely in waterless alcohol and in ether, and will become dissolved also in spirit of high strength, to the extent of three-fifths of the weight of the latter. Solutions of this kind may become valuable for various technical purposes, and afford some tests for the pureness of the oil. If pressed under heat it will deposit margaritin. Heated in a retort about one-third of the oil will distil over, and a substance resembling india-rubber remains, which saponises with alkalies. Other educts are at the same time obtained, which will likely become of industrial value. These facts are briefly mentioned here merely to explain that the value of this easily-produced oil is far more varied than is generally supposed, and this remark applies with equal force to many other chemical compounds from vegetable sources, briefly alluded to in this present enumerative treatise. The seeds contain also a peculiar alkaloid—ricinin. The solid chemical compound of castor oil is the crystalline isocetic acid (a glycerid). The oil contains also a non-crystalline acid peculiar to it (ricinoleic acid). For the production of a particular kind of silk the Recinus plant is also important, inasmuch as the hardy Bombyx Arrindi requires for food the leaves of this bush. Even a few of the seeds if swallowed will produce poisonous effects.

Robinia pseudacacia, Linné.

The North American Locust Acacia. Height to 90 feet. The strong, hard, and durable wood is for a variety of purposes in use, and particularly eligible for treenails, axletrees, and turnery. The natives use the wood for their bows. Tree of rapid growth, and attains an age of several hundred years. It may be planted closely for timber-belts and hedge-shelter on farm-lands. It is one of the best trees for renovating exhausted land and for improving poor soil. Recommended by Wessely as one of the easiest grown of all trees on bare sand, though standing in need of twice as much mineral aliment as Pinus silvestris and nearly as much as poplars. It

pushes through shifting sand its spreading roots, which attain a length of 70 feet. It will maintain its hold in hollows of drifts where even poplars fail (Wessely). The roots are poisonous. The allied R. viscosa attains a height of 40 feet. No less than four arborescent Robinias are recorded from Juan Fernandez.

Roccella tinctoria, Candolle.

Canary Islands, Azores, also in Middle and South Europe and North Africa. This Lichen furnishes the litmus, orseille or orchil for dyes and chemical tests. It is a question of interest whether it could be translocated and naturalised on the cliffs also of our shores. Other dye-lichens might perhaps still more easily be naturalised; for instance, Lecanora tartarea, L. parella, Pertusaria communis, Parmelia sordida, Isidium corallinum, and some others, which furnish the Cudbear or Persio.

Rosa centifolia, Linné.

The Cabbage Rose. Indigenous on the Caucasus and seemingly also in other parts of the Orient. Much grown in South Europe and South Asia for the distillation of rose-water and oil or attar of roses. No pruning is resorted to, only the dead branches are removed; the harvest is from the middle of May till nearly the middle of June; the gathering takes place before sunrise (Simmonds). From 12,000 to 16,000 roses, or from 250 lbs. to 300 lbs. of rose petals, are required according to some calculations for producing a single ounce of attar through ordinary distillation. The flowers require to be cut just before expansion; the calyx is separated and rejected; the remaining portions of the flowers are then subjected to aqueous distillation, and the saturated rose-water so obtained is repeatedly used for renewed distillation, when from the overcharged water the oil separates on a cold place and floats on the surface, from whence it can be collected after refrigeration by fine birds'-feathers. Rose oil consists of a hydrocarbon stearopten which is scentless, and an elaeopten which is the fragrant principle. But some other methods exist for producing the oil; for instance, it may be got by distilling the rosebuds without water at the heat of a salt-water bath. The odour may also be withdrawn by alcoholic distillation from the roses, or be extracted by the "enfleurage" process. The latter is effected by placing the flowers, collected while the weather is warm, into shallow frames covered with a glass plate, on the inner side of which a pure fatty substance has been thinly spread. The odour of the flowers is absorbed

by the adipose or oleous substance, though the blossoms do not come with it in direct contact; fresh flowers are supplied daily for weeks. The scent is finally withdrawn from its matrix by maceration with pure alcohol. Purified Eucalyptus oil can be used for diluting rose oil, when it is required for the preparation of scented soap.

Rosa Damascena, Miller.

Orient. Allied to the preceding species, aud also largely used for the production of essential oil of roses.

Rosa Gallica, Linné.

The French or Dutch Rose. Middle and South Europe, Orient. The intensely coloured buds of this species are particularly chosen for drying. These, however, may be got also from other kinds of roses.

Rosa Indica, Linné.

Noisette Rose. From Upper India to China and Japan. Some roses of the sweetest scent are derived from this species.

Rosa lævigata, Michaux. (*R. Sinica,* Aiton.)

The Cherokee Rose. China and Japan. Considered one of the best hedge-roses, and for that purpose much employed in North America. It serves also well for bowers. Allied to the foregoing species. Rosa rugosa, Thunberg, of Japan, a large-fruited and large-leaved rose, is exceedingly well adapted for garden hedges.

Rosa moschata, Miller.

North Africa and South Asia as far east as Japan. From the flowers of this extremely tall climbing species also essential oil is obtained. The attar thus derived from roses of not only different varieties, but even distinct species, must necessarily be of various qualities. In the Balkan Mountains, on basalt slopes facing south, the most odorous roses are produced. At Kesaulik rose-distillation is the main industry. Shoots of rose-bushes are placed in trenches 3 feet deep and 5 feet apart. Irrigation promotes the growth. The gathering commences in the third and lasts till about the fifteenth year (Simmons). Schlagintweit gives as the yield of attar in the Balkan ranges $\frac{1}{280}$ of the petals in cool and $\frac{1}{400}$ in warm weather by careful distillation and refrigeration. The pure oil as a European commodity is worth from £20 to £23 per pound. This is also the rose, according to Schlagintweit, used

for attar distillation in Tunis. Pure attar, valued at 30 shillings per ounce, is produced in Roumelia to the amount of £80,000 annually (Piesse).

Rosa sempervirens, Linné.

From South Europe through Southern Asia to Japan. One of the best rose-bushes for covering walls, fences, and similar structures. The flowers of this species also can be utilised for rose oil.

Rosa setigera, Michaux.

North America, where it is the only climbing rose-bush. It deserves introduction on account of its extremely rapid growth, —10 feet to 20 feet in a season. Its flowers, however, are nearly inodorous.

Other original species of roses deserve our attention, Sir Joseph Hooker admitting about thirty, all from the northern hemisphere. But on the snow-clad unascended mountains of Borneo, Sumatra, New Guinea, and Africa south of the equator, perhaps new roses may yet be discovered, as they have been traced south to Abyssinia already.

Rosa spinosissima, Linné.

Europe, North Africa, Middle and North Asia. Adapted for holding coast-sands; unapproachable to pasture animals, and not spreading like the Sweet Briar, R. rubiginosa (L.), into culture-land or pastures.

Rosmarinus officinalis, Linné.

The Rosemary. Countries around the Mediterranean Sea. This well-known bush is mentioned here as a medicinal plant, from which a distilled oil is rather copiously obtainable. One of our best plants for large garden-edgings. The oil enters into certain compositions of perfumery.

Royenia pseudebenus, E. Meyer.

South Africa. Only a small tree, but its wood jet black, hard, and durable; thus in Capeland and Caffraria called ebony. R. pubescens (Willd.), according to Dr. Pappé, furnishes there a wood adapted for xylography; this may give a clue to the adaptability of many other kinds of woods in the large Order of Ebenaceæ as substitutes for the Turkish boxwood.

Rubia cordifolia, Linné. (*R. Mungista*, Roxburgh.)

From the Indian highlands, through China and Siberia, to

Japan; also occurring in various parts of Africa, as far south as Caffraria and Natal. This perennial plant produces a kind of madder. Probably other species likewise yield dye-roots. The genus is represented widely over the globe, but, as far as known, not in Australia.

Rubia peregrina, Linné.

Middle and South Europe, South-West Asia. This perennial species also yields madder-root. Several other kinds deserve comparative test-culture.

Rubia tinctorum, Linné.

The Madder. Countries around the Mediterranean Sea. A perennial herb of extremely easy culture. Soil fit for barley suits, also for madder. Its culture opens any deep subsoil and suffocates weeds, but requires much manure, leaving then, however, the land enriched. Any stagnant water in the soil must be avoided, if madder is to succeed. The harvest is in the second or third year. It can be raised from seeds or planted from offshoots. The roots merely dried and pounded form the dye. The chemical contents are numerous: in the herb, rubichloric and rubitannic acid; in the root, alizarin, purpurin, rubiacin, rubian, ruberythrin acid, and three distinct resins; also chlorogenin, xanthin, and rubichloric acid. On the five first depend the pigments produced from the root. Madder is one of the requisites for alizarin ink. Since the manufacture of artificial alizarin from anthacene, a constituent of coal-tar, has commenced, the cultivation of madder has declined. Still it remains a valuable root, handy for domestic dye.

Rubus Canadensis, Linné.*

The Dewberry of North America. A shrub of trailing habit. Fruit black, of excellent taste, ripening earlier than that of R. villosus (Ait.), which constitutes the High Blackberry of the United States, with large fruits.

Rubus Chamæmorus, Linné.

The Cloudberry. North Europe, North Asia, North America, particularly in the frigid zone. A perennial but herbaceous plant; a pigmy amongst its congeners. Nevertheless it is recommended for introduction to spongy, mossy, Alpine moors, on account of its grateful amber-coloured or red fruit. All the species can readily be raised from seeds. R. Articus (L.), also with edible fruit, is in the high north usually its

companion. A similar little herb, living for a great part of the year in snow—namely, R. Gunnianus (Hook.)—occurs on the Alpine heights of Tasmania, from whence it might be easily transferred to snowy mountains of other countries. The fruit of R. Gunnianus is red and juicy, but not always well developed.

Rubus cuneifolius, Pursh.

The Sand Blackberry. North America. A dwarf shrub. The fruit is of agreeable taste.

Rubus deliciosus, Torrey.

On the sources of the Missouri. An erect shrub. Fruit raspberry-like, large and grateful. An exceedingly handsome species.

Rubus ellipticus, Smith. (*R. flavus,* Hamilton.)

On the mountains of India (4,000 to 7,000 feet), also in Ceylon and Yunan. A large bush with yellow fruits, which are reckoned in flavour fully equal to the ordinary Raspberry (C. B. Clarke).

Rubus fruticosus, Linné.*

The ordinary Blackberry or Bramble. All Europe, North and South Africa, Middle and Northern Asia. The shrub bears well in a temperate clime. In some countries it is a favourite plant for hedges. It likes, above all, calcareous soil, though it is content with almost any, and deserves to be naturalised on the rivulets of any ranges. R. corylifolius (Sm.), R. suberectus (Andr.), and R. leucostachys (Sm.) are varieties like many other named kinds of European Blackberries, or perhaps belong to the closely allied R. caesius (L.), *the English Dewberry; or in some instances hybrid forms may* have arisen from the two, although the generality of these various Blackberry bushes bear their fruit freely enough.

Rubus geoides, Smith.

Falkland Islands, Fuegia, Patagonia, and Chiloe. A herbaceous kind of Raspberry-plant with greenish-yellow fruits, resembling the Cloudberry, and of a very agreeable taste. Best adapted for mountainous regions.

Rubus Havaiensis, A. Gray.

Sandwich Islands. The fruits of this bramble shrub are raspberry-like.

Rubus Idaeus, Linné.*

The ordinary Raspberry. Europe, Northern and West Asia. It is mentioned here to point out the desirability of naturalising the plant on mountains and on river banks. The fruits contain a stereopten. Leaves a substitute for tea.

Rubus imperialis, Chamisso.

Brazil and Argentina. Furnishes superior fruits.

Rubus lasiocarpus, Smith.

India, reaching in the Himalayas an elevation of 8,000 feet, in Ceylon of 6,000 feet. The black fruit is very palatable. R. biflorus (Hamilton) ascends with R. rosifolius to 10,000 feet; its fruit, either red or orange, is sweet (J. D. Hooker).

Rubus macropetalus, Douglas.*

California and Oregon. An unisexual shrub. Fruit black, oval-cylindric, particularly sweet.

Rubus occidentalis, Linné.*

The Black Raspberry or Thimbleberry. North America. A species with woody stems and nice fruits, with a glaucous bloom, well flavoured and large. It ripens early.

Rubus odoratus, Linné.*

North America. A kind of Raspberry. A handsome species on account of its large purple flowers. Berry edible. Culture would doubtless enhance the value of the fruits of many of these Rubi. Hybridising might be tried.

Rubus parvifolius, Linné.

East Asia, East and South Australia. In the Alps of Victoria it produces much finer fruits than in the lowlands.

Rubus rosifolius, Smith.

Tropical and sub-tropical regions of Africa and Asia, also throughout the littoral forests of East Australia. This shrub bears in woody regions an abundance of fruits of large size, and these early and long in the season.

Rubus rugosus, Smith.

South Asia. The fruit, which ripens all the year round in temperate climes, is nearly twice the size of the ordinary Blackberry.

Rubus strigosus, Michaux.

North America. Closely allied to the European Raspberry. Its fruits large, also of excellent taste. It would lead too far to enumerate other kinds of Rubus, although about a hundred genuine species occur, which render the genus one of very wide dispersion over the globe.

Rubus trivialis, Michaux.*

Southern States of North America. Another shrubby species with good edible fruits, which are large and black. The plant will thrive in dry sandy soil. Like many other species, rich in tannic acid.

Rumex acetosa, Linné.

The Kitchen Sorrel. Europe, Middle and North Asia to Japan, also in the frigid zone of North America. A perennial herb. The tender varieties, particularly the Spanish one, serve as pleasant acidulous vegetables, but must be used in moderation, as their acidity, like that of the species of Oxalis (Wood Sorrel), depends on binoxalate of potash. The South African R. luxurians (L.) serves likewise as culinary sorrel.

Rumex Patientia, Linné.

Middle and South Europe, Middle Asia. Biennial. The young leaves furnish a palatable sorrel, like spinach. In cold climes it pushes forth its leaves before the frost is hardly gone, and thus comes in as one of the first vegetables of the season.

Rumex scutatus, Linné.

The French Sorrel. Middle and South Europe, North Africa, Orient. Also perennial, and superior to the foregoing as a culinary plant. They are all of use against scurvy and most easily reared.

Rumex vesicarius, Linné.

South Europe, Middle Asia, North Africa. An annual herb of similar utility as the former ones.

Ruscus aculeatus, Linné.

Middle and South Europe, North Africa, South-West Asia. This odd plant is the only shrubby species of the genus. It serves for forming garden hedges. The young shoots of this and others are edible.

Ruta graveolens, Linné.

The Rue. Mediterranean countries and the Orient. The foliage of this acrid and odorous shrub, simply dried, constitutes the Rue-herb of medicine. The allied R. sylvestris (Mill.) is still more powerful in its effect. These plants and others of the genus contain a peculiar volatile oil and a glycosid (Rutin).

Sabal Adamsoni, Guernsent.

Dwarf Palmetto. South Carolina, Georgia, and Florida. A stemless Fan-Palm, with the two following and Chamærops Hystrix attaining the most northerly positions of any American Palms. According to Count de Saporta it resists a temperature as low as 17° F. This Palm does well in marshy places.

Sabal Palmetto, Roemer and Schultes.*

Extends from Florida to North Carolina, also Bermuda Islands. The stem attains a height of 40 feet. This noble Palm delights on sandy coast tracts.

Sabal serrulata, Roemer and Schultes.

South Carolina, Georgia, and Florida. The stem grows to 8 feet high; particularly well adapted for sea-coasts. The leaves can be used for cabbage-tree hats and other purposes for which palm-leaves are sought. The fibrous spongy parts of the stem serve as brushes.

Sabal umbraculifera, Martius.

West India. Attains, according to Grisebach, a height of 80 feet, or, according to others, even over 100 feet. Though naturally a tropical Savannah-Palm, it has proved even hardier than the Orange. Another equally tall Antillan-Palm is S. glaucescens (Loddiges).

Sabbatia angularis, Pursh.

North-East America. This biennial pretty herb is lauded as a substitute for gentian by American physicians, and might with other congeners be grown in medicinal gardens, though its naturalisation would not be desirable, as stock avoid the bitter gentianaceous plants.

Saccharum officinarum, Linné.

The Sugar-Cane. India, China, South Sea Islands, not indigenous in any part of America or Australia. Sugar-cane

having been cultivated in Spain and other countries on the Mediterranean Sea, it will be worthy of further trial at what distance from the equator and at what elevations in other parts of the globe sugar from cane can be produced to advantage. In the United States the profitable culture of cane ceases at 32° north latitude; in Japan it is carried on with advantage up to 36° north latitude, and even further northward (General Capron); the average yield there of raw sugar is 3,300 lbs. per acre; in China it extends only to 30° north latitude. In the last-mentioned country the culture of sugar-cane dates from the remotest antiquity; moreover, we have from thence a particular kind (S. Sinense, Roxb.), which is hardier and bears drought better than the ordinary cane; this kind needs renewal only every second or third year, and ripens in seven months, if planted early in spring, but if planted in autumn and left standing for fully a year the return of sugar is larger. Moderate vicinity to the sea is favourable for the growth of canes. Prolific yields have been secured in East Australia as far south as 28°.

The multiplication of all sorts of sugar-cane is usually effected from top-cuttings, but this cannot be carried on from the same original stock for an indefinite period without deterioration; and as seeds hardly ever ripen on the canes, new plants must from time to time be brought from a distance. Thus, New Caledonia has latterly supplied its wild-growing splendid varieties for replanting many sugar-fields in Mauritius. The Bourbon variety is praised as one of the richest for sugar; the Batavian variety, S. violaceum (Tussac), is content with less fertile soil. Many other varieties are known. Excessive rains produce a rank luxuriance of the canes at the expense of the saccharine principle. Rich manuring is necessary to attain good crops, unless in the best of virgin soil. The lower leaves of the stem must successively be removed, also superabundant suckers, to promote the growth upwards, and to provide ventilation and light. Out of the remnants of sugar-cane molasses, rum, and taffia can be prepared. The average yield of sugar varies from 1 ton 6 cwt. to 3 tons for the acre. For fuller information the valuable local work of Mr. A. McKay, "The Sugar-cane in Australia," should be consulted. The stately S. spontaneum (L.), which extends from India to Egypt, is available for scenic culture. It attains a height of 15 feet. Other tall kinds of Saccharum occur in South Asia.

Sagittaria lancifolia, Linné.

From Virginia to the Antilles. This very handsome aquatic

plant can doubtless be utilised like the following species. It attains a height of 5 feet.

Sagittaria obtusa, Muehlenberg. (*S. latifolia,* Willdenow.)

North America, where it replaces the closely-allied S. sagittifolia. A few other conspicuous species are worthy of introduction. The Tule or Wapatoo root of California is derived from a species of Sagittaria.

Sagittaria sagittifolia, Linné.

Europe, North and Middle Asia, east to Japan. One of the most showy of all hardy water-plants; still not alone on that account deserving naturalisation, but also because its root is edible. If once established, this plant maintains its ground well, and might occupy spots neither arable nor otherwise utilised.

Salix alba, Linné.

The Huntingdon or Silky Willow of Europe, originally probably from Middle Asia. Available for wet places not otherwise utilised. Height 80 feet, circumference of stem 20 feet; of rapid growth. Wood eligible where lightness, pliancy, elasticity, and toughness are required; hence in request for wheel-floats and shrouding of water-wheels, as it is not subject to splinter; also used for turnery, trays, fenders, shoe-lasts, light handles (Simmonds). Timber, according to Robb, the lightest and softest of all woods, available for bungs; it is planed into chips for hat-boxes, baskets, and wove bonnets, also for cricket bats, boxes, &c. The bark is particularly valued as a tan for certain kinds of glove leather to which it imparts an agreeable odour. The Golden Osier, Salix vitellina (L.), is a variety. The shoots are used for hoops and wicker-work. With other large Willows and Poplars one of the best scavengers for back yards where drainage cannot readily be applied; highly valuable also for forming lines along narrow watercourses or valleys in forests, to stay bush-fires. The charcoal excellent for gunpowder. The wood in demand for matches.

Salix Babylonica, Tournefort.

The Weeping Willow, indigenous in West Asia as far as Japan, sparingly wild, according to Stewart, in the Himalayas; probably also in Persia, Kurdistan, and China. One of the most grateful of all trees for the facility of its culture, rapidity of growth, and fitness for embellishments. Also as one of the quickest growing and most easily reared of all shade-trees, Dr. C. Koch distinguishes another Weeping Willow as S.

elegantissima from Japan. Important for consolidating river banks.

Salix Capensis, Thunberg. (*S. Gariepina,* Burchell.)

South Africa. This Willow might be introduced on account of its resemblance to the ordinary Weeping Willow. S. daphnoides (Vill.) of Europe and Asia, S. petiolaris (Smith), S. cordata (Muehlenb.), S. tristis (Ait.), of North America, are among the best for binding sand. S. longifolia (Muehlenb.), also North American, is among those which form long flexible withes.

Salix caprea, Linné.

Europe, North and Middle Asia. The British Sallow or Hedge Willow; grows also to a tree; wood useful for handles and other implements, the shoots for hoops. It is largely employed for the coal for gunpowder. Bark for tanning, particularly glove leather. The flowers are eagerly sought by bees. It is the earliest flowering Willow.

Salix cordata, Muehlenberg.

One of the Osiers of North America.

Salix daphnoides, Villars.

Middle Europe and Northern Asia, as far as the Amoor, ascending to 15,000 feet in the Himalayas. A tree of 60 feet in height, of remarkable rapidity of growth, attaining 12 feet in four years. It is much chosen to fix the ground at railway embankments, on sandy ridges and slopes, for which purpose its long-spreading and strong roots render it particularly fit. The twigs can be used for baskets, wicker-work, and twig-bridges (Stewart and Brandis). The foliage furnishes cattle fodder. The tree is comparatively rich in salicin, like S. pentandra (L.) and the following.

Salix fragilis, Linné.

The Crack-Willow. Indigenous in South-Western Asia. Height 90 feet, stem to 20 feet in girth. A variety of this species is the Bedford Willow, also called Leicester Willow, Salix Russelliana (Smith), which yields a light, elastic, tough timber, more tannin in its bark than oak, and more salicin (a substitute for quinine and most valuable as an anti-rheumatic remedy) than most congeners. According to Sir H. Davy the young layers of the bark contain 16 per cent. tannin, the whole bark only about 7 per cent. One of the dwarf American Willows, perhaps S. tristis (Aiton), has been

traced on the coast-sands of California to send out root-like stems up to 120 feet in length.

Salix Humboldtiana, Willdenow.

Through a great part of South America, southward as far as Patagonia, there furnishing building-timber for inside structures. This Willow is of pyramidal habit, attains a height of 50 feet and more. The wood is much in use for yokes and other implements. Many kinds of Willow can be grown for consolidating shifting sand ridges.

Salix lucida, Muehlenberg.

One of the Osiers of North America.

Salix nigra, Marshall. (*S. Purshiana,* Sprengel.)

The Black Willow of North America. It attains a height of 30 feet. The Black Willow is one used for basket-work, although it is surpassed in excellence by some other species, and is more important as a timber Willow. Mr. W. Scaling, of Basford, includes it among the sorts which he recommends in his valuable publication, "The Willow" (London, 1871).

Salix purpurea, Linné.*

Of wide range in Europe and West Asia. One of the Osiers. In deep moist soil, not readily otherwise utilised, it will yield annually four to five tons of the best of rods, qualified for the finest work. Impenetrable, not readily inflammable, screens 25 feet high can be reared from it in five years. In localities exposed to storms, willow-screens fully 40 feet high can be raised. It is invaluable also for the reclamation of land along watercourses. Rich in salicin. From Mr. Scaling's treatise on the Willow, resting on unrivalled experience, it will be observed that he anew urges the adoption of the Bitter Willow (also called the Rose Willow or the Whipcord Willow), S. purpurea (L.), for game-proof hedges, this species scarcely ever being touched by cattle, rabbits, and other herbivorous animals. Not only for this reason, but also for its very rapid growth and remunerative yield of the very best of basket material, he recommends it for field hedges. Cuttings are planted only half a foot apart, and must be entirely pushed into the ground. The annual produce from such a hedge is worth 4s. to 5s. for the chain. For additional strength the shoots can be interwoven. In rich bottoms they will grow from 7 feet to 13 feet in a year. The supply of basket material from this species has fallen very far short of the

demand in England. The plant grows vigorously on light soil or warp-land, but not on clay. S. rubra (Huds.) is also admirably adapted for hedges. The real Osier, S. viminalis (L.), is distinguished by basket-makers as the soft-wooded willow, and is the best for rods requiring two years' age, and also the most eligible for hoofs, but inferior to several other species for basket manufacture. S. triandra (L.) is a prominent representative of the hard-wooded basket-willows, and comprises some of the finest varieties in use of the manufacturers. A crop in the third year after planting from an acre weighs about 12 tons, worth £3 for the ton. S. fragilis (L.) and S. alba (L.) are more important as timber willows, and for growing hoop-shoots. Their rapidity of growth recommends them also for shelter-plantations, to which advantage may be added their uninflammability and their easy propagation; the latter quality they share with most willows. Mr. Scaling's renewed advocacy for the formation of willow plantations comes with so much force that his advice is here given, though condensed in a few words. Osier plantations come into full bearing in the third year; they bear for ten years and then slowly decline. The raw produce from an acre in a year averages 6 tons to 7½ tons, ranging in price from £2 10s. to £3 10s. for the ton (unpeeled). Although 7,000 acres are devoted in Britain to the culture of basket-willows (exclusive of spinneys and plantations for the farmers' own use), yet in 1866 there had to be imported from the Continent 4,400 tons of willow branches, at a value of £44,000, while besides the value of the made baskets imported in that year was equal to the above sum. In recent years the importation into the United States of willow material for baskets, chairs, etc., has, according to Simmonds, been valued as approaching £1,000,000. Land comparatively valueless for root or grain crops can be used very remuneratively for osier plantations. The soft-wooded willows like to grow in damper ground than the hard-wooded species. The best peeled willow branches fetch as much as £25 for the ton. Peeling is best effected by steam, by which means the material is also increased in durability. No basket-willow will thrive in stagnant water. Osier plantations in humid places should therefore be drained. The cuttings are best taken from branches one or two years old, and are to be planted as close as one foot by one foot and a half. No part of the cutting must remain uncovered, in order that only straight shoots may be obtained; manuring and ploughing between the rows is thus also facilitated, after the crop has been gathered, and this, according to the approved Belgian

method, must be done by cutting the shoots close to the ground after the fall of the leaves. The accidental introduction from abroad of the destructive saw-flies (particularly Nematus ventralis), which prey also on currant and gooseberry bushes, should be guarded against.

Salix rubra, Hudson.*

Throughout Europe, also in West Asia and North Africa; it is much chosen for osier beds. When cut down, it will make shoots 8 feet long in a season. Porcher regards it as one of the most valuable species for work in which unpeeled rods are used.

Salix tetrasperma, Roxburgh.

Mountains of India, from 2,000 to 7,000 feet. Height of tree 40 feet. This thick-stemmed Willow is worthy of a place on the banks of watercourses. The twigs can be worked into baskets, the wood serves for gunpowder, the foliage for cattle fodder.

Salix triandra, Linné.* (*S. amygdalina,* Linné.)

The Almond-Willow; through nearly all Europe and extra-tropical Asia. Height of tree 30 feet. Shoots 9 feet long, for hoofs and white basket-work, being pliant and durable. The bark contains a good deal of salicin. S. lanceolata (Smith) is a hybrid between S. triandra and S. viminalis, according to Anderson.

Salix viminalis, Linné.*

The common Osier of Europe and North and West Asia; attains the height of 30 feet. One of the best for wicker-work and hoops; when cut, it shoots up to a length of 12 feet. It would lead too far to enumerate even all the more important Willows on this occasion. Professor Anderson, of Stockholm, admits 158 species. Besides these, numerous hybrids exist. Many of the taller of these Willows could be grown to advantage.

Salpichroma rhomboidea, Miers.

Extra-tropical South America, as far south as Magellan's Straits. A half-shrub, with good-sized berries of vinous taste (Lorentz).

Salvia Matico, Grisebach.

Sub-Alpine Argentina. An important medicinal herb.

Salvia officinalis, Linné.

The Garden Sage. Countries on the Mediterranean Sea. A somewhat shrubby plant of medicinal value, pervaded by essential oil. Prefers calcareous soil. Among nearly half a thousand species of this genus some are gorgeously ornamental.

Sambucus Canadensis, Linné.

North-East America. The berries of this half-woody Elder are used, as well as those of Phytolacca decandra, for colouring vinous liquids. Dr. Gibbons observes that this species is recognised in the United States Pharmacopœia, and that the Californian species (S. glauca and S. racemosa) possess similar medicinal properties. The flowers are gently excitant and sudorific, the berries diaphoretic and aperient (wine frequently manufactured from them), and the inner bark in large doses a hydragogue cathartic and emetic. S. xanthocarpa (F. v. Mueller) is a large Elder tree of extra-tropical East Australia.

Sambucus nigra, Linné.

The ordinary Elder. Europe, North Africa, Middle Asia. Known to have exceptionally attained a height of 35 feet. The flowers are of medicinal value, and an essential oil can be obtained from them. The wood can be utilised for shoe-pegs and other purposes of artisans. The berries are used for colouring port wine and for other purposes of dye.

Sanguinaria Canadensis, Linné.

North-East America. A perennial herb. The root important as a therapeutic agent, contains also dye principles.

Sanguisorba minor, Scopoli. (*Poterium Sanguisorba,* Linné.)

The Salad Burnet. Europe, North Africa, North and Middle Asia. A perennial, easily disseminated and naturalised herb, particularly adapted for calcareous soils. Serves as salad and particularly as a sheep fodder.

Sanseviera Zeilanica, Willdenow.

India. This thick-leaved liliaceous plant should not be passed in this enumeration, as it has proved hardy in places free of frost. Four pounds of leaves give about one pound of fibre, which unites with softness and silky lustre extraordinary strength and tenacity, serving in its native country for bow-strings. The plant might be left to itself in rocky unutilised places. Several allied species exist.

Santalum album, Linné.*

India, ascending to the temperate elevations of Mysore. A small or middle-sized tree, famed for its fragrant wood and roots. In the drier and stony parts of ranges the greatest fragrance of the wood is generated. S. Freycenetianum (Gaudichaud) produces sandal-wood on the mountains of the Sandwich Islands up to 3,000 feet. Several other species occur in Polynesia. The precious sandal-oil is obtained by slow distillation from the heartwood and root, the yield being about two and a half per cent.

Santalum cygnorum, Miquel.

South-Western Australia, where this tree yields scented sandal-wood.

Santalum Preissianum, Miquel. (*S. acuminatum,* A. de Candolle.)

The Quandong. Desert country of extra-tropical Australia. The fruits of this small tree are called Native Peaches. As both the succulent outer part and kernel are edible, it is advisable to raise the plant in desert tracts.

Santalum Yasi, Seemann.

The Sandal Tree of the Fiji Islands, where it grows on dry and rocky hills. It is likely to prove hardy and deserves, with a few other species from the South Sea Islands yielding scented wood, test culture in warm temperate regions.

Santolina cyparissias, Linné.

Countries on the Mediterranean Sea. A very aromatic and handsome bush, of medicinal value. There are several allied species.

Saponaria officinalis, Linné.

The Soapwort or Fuller's Herb. Europe, North and Middle Asia. A perennial herb of some technologic interest, as the root can be employed with advantage in some final processes of washing silk and wool, to which it imparts a peculiar gloss and dazzling whiteness, without injuring in the least the most sensitive colours. Experiments instituted in the laboratory of the Botanic Garden of Melbourne render it highly probable that saponin, which produces the froth from the soapwort, is also present in the bark and root of Acacia (Albizzia) lophanta (W.). At all events, a substance closely resembling saponin was unexpectedly detected (in the course

of other investigations entrusted to Mr. Rummel) in the bark of this Acacia, and this substance occurred in so large a proportion as to constitute 10 per cent. of the dry bark.

Sassafras officinale, Hayne.

The deciduous Sassafras Tree, indigenous from Canada to Florida, in dry open woods. Height 60 feet. The stem has been known to attain a girth of more than 19 feet at 3 feet from the ground. It furnishes the medicinal Sassafras bark and wood, and from this again an essential oil is attainable. The deciduous and often jagged leaves are remarkable among those of Lauraceæ. They are used as a condiment in cookery. The root bark contains 58 per cent. tannin (Reinsch).

Satureja hortensis, Linné.

The Summer Savory. Countries around the Mediterranean Sea. An annual scent-herb, from which an essential aromatic oil can be distilled. The culture of this and allied plants is easy in the extreme.

Satureja montana, Linné.

The Winter Savory. On arid hilly places at and near the Mediterranean Sea. A perennial somewhat shrubby herb, frequently used as a culinary condiment along with or in place of the foregoing species, although it is scarcely equal to it in fragrance.

Satureja Thymbra, Linné.

Countries on or near the Mediterranean Sea. A small evergreen bush, with the flavour almost of thyme. The likewise odorous S. Graeca (L.) and S. Juliana (L.) have been transferred by Bentham to the closely cognate genus Micromeria; they are in use since Dioscorides' time, though not representing, as long supposed, the Hyssop of that ancient physician.

Saussurea Lappa, Bentham. (*Haplotaxis Lappa,* Decaisne.)

Cashmere. The aromatic root of this perennial species is of medicinal value, and by some considered to be the Costus of the ancients.

Saxono-Gothæa conspicua, Lindley.

The Mahin of Southern Chili. A middle-sized tree, with fine-grained yellowish timber.

Scandix grandiflora, Linné.

Countries around the Mediterranean Sea. An annual herb, much liked there as a salad for its pleasant aromatic taste.

Schima Wallichii, Choisy.

India, up to 5,000 feet. A tree attaining a height of 100 feet. Timber highly valuable (C. B. Clarke).

Schizostachyum Blumei, Nees.

Java, at an elevation of about 3,000 feet. A lofty Bamboo. A few other species, less elevated, occur in China, the South Sea and Philippine Islands, and Madagascar. The genus might well be united with Melocanna. The Bamboos being thus brought once more before us, it may be deemed advisable to place together into one brief list all other kinds which are recorded either as very tall or as particularly hardy. Accordingly, from Major-General Munro's admirable monograph ("Linnean Transactions," 1868), the succeeding enumeration is compiled, and from that masterly essay, resting on very many years' close study of the richest collections, a few prefatory remarks are likewise offered, to vindicate the wish of the writer of seeing these noble and graceful forms of vegetation largely transferred to every part of Australia, where they would impress a grand tropical feature on the landscapes. Even in the far southern latitudes of Victoria, Tasmania, and New Zealand, Bamboos from the Indian lowlands have proved to resist our occasional night frosts of the low country. But in colder places the many Sub-Alpine species could be reared. Be it remembered that Chusquea aristata advances to an elevation of 15,000 feet on the Andes of Quito, indeed to near the zone of perpetual ice. Arundinaria falcata, A. racemosa, and A. spathiflora live on the Indian highlands, at a zone between 10,000 and 11,000 feet, where they are annually beaten down by snow. Forms of Bambusaceæ still occur, according to Grisebach, in the Kurilian archipelagus up to 46° N., and in Japan even to 51°. We may further recognise the great importance of these plants, when we reflect on their manifest industrial uses, or when we consider their grandeur for picturesque scenery, or when we observe their resistance to storms or heat, or when we watch the marvellous rapidity with which many develop themselves. Their seeds, though generally produced only in long intervals, are valued in many instances higher than rice. The ordinary great Bamboo of India is known to grow 40 feet in forty days, when bathed in the moist heat of the jungles. Delchevalerie witnessed the growth of some Indian Bamboos at Cairo to have been 10

inches in one night. Their power of growth is such as to upset stone-walls or demolish substantial buildings. As shelter-plants for grazing-animals these tree-reeds are most eligible. The Bourbon Bamboo forms an impenetrable Sub-Alpine belt of extraordinary magnificence in yonder island. One of the Tenasserim Bambusas rises to 150 feet, with a diameter of the mast-like cane sometimes measuring fully one foot. The great West Indian Arthrostylidium is sometimes nearly as high and quite as columnar in its form, while the Dendrocalamus at Pulo Geum is equally colossal. The Platonia Bamboo of the highest wooded mountains of Panama sends forth leaves 15 feet in length and one foot in width. Arundinaria macrosperma, as far north as Philadelphia, rises still in favourable spots to a height of nearly 40 feet, and one of the Japan Bamboos, according to Mr. Christy, gains, even those in extra-tropical latitudes, the height of 60 feet. Through perforating with artistic care the huge canes of various Bamboos, musical sounds can be melodiously produced when the air wafts through the groves, and this singular fact may possibly be turned to practice for checking the devastations from birds on many a cultured spot. Altogether twenty genera, with one hundred and seventy well-marked species, are circumscribed by General Munro's consummate care; but how may these treasures yet be enriched, when once the snowy mountains of New Guinea through Bamboo jungles become ascended, or when the Alps on the sources of the Nile, which Ptolemæus and Julius Cæsar already longed to ascend, have become the territory also of phytologic researches, not to speak of many other tropical regions as yet left unexplored! Europe possesses no Bamboo; Australia, as far as hitherto ascertained, only one (in the interior of Arnhem's Land). Almost all Bamboos are local, and there seems really no exception to the fact that none are indigenous to both hemispheres; all true Bambusas being Oriental. Observations on the growth of many Bamboos in Italy are recently offered by Chevalier Fenzi.

The introduction of these exquisite plants is one of the easiest imaginable, either from seeds or the living roots. The consuls at distant ports, the missionaries, the mercantile and navigating gentlemen abroad, and particularly also any travellers, could all easily aid in transferring the various Bamboos from one country to the other—from hemisphere to hemisphere. Most plants of this kind once well established in strength under glass can be trusted out to permanent locations with perfect and lasting safety at the commencement of the warm season. Indeed, Bamboos are hardier than most

Guadua refracta, Munro. Brazil. Height to 30 feet.
Guadua Tagoara, Kunth. South Brazil; ascends to 2,000 feet. Height to 30 feet.
Guadua virgata, Rupr. South Brazil. Height to 25 feet.
Merostachys Clausseni, Munro. South Brazil. Height to 80 feet.
Merostachys Kunthii, Ruprecht. South Brazil. Height to 30 feet.
Merostachys ternata, Nees. South Brazil. Height to 20 feet.
Nastus Bourbonicus, Gmel. Bourbon, Sumatra; ascends to 4,000 feet. Height to 50 feet.
Oxytenanthera Abyssinica, Munro. Abyssinia to Angola; ascends to 4,000 feet. Height to 50 feet.
Oxytenanthera albo-ciliata, Munro. Pegu, Moulmein. Tall, scandent.
Phyllostachys bambusoides, S. and Z. Himalaya, China, and Japan. Height to 12 feet.
Phyllostachys nigra, Munro. China, Japan. Height to 25 feet.
Platonia nobilis, Munro. New Granada, colder region.
Pseudostachyum polymorphum, Munro. Himalaya; ascends to 6 000 feet. Very tall.
Teinostachyum Griffithi, Munro. Tall and slender.
Thamnocalamus Falconeri, J. Hook. Himalaya; ascends to 8,000 feet. Tall.
Thamnocalamus spathiflorus, Munro. Himalaya; ascends to 11,000 feet. Tall.

Schizostachyum brachycladum, Kurz.

Sunda Islands and Moluccas. Stems to 40 feet high, very hollow. The short branches give to this Bamboo a peculiar habit. One variety has splendidly yellow stems.

Schizostachyum elegantissimum, Kurz.

Java, at elevations from 3,000 to 6,000 feet. Unlike all other Bamboos, this bears flowers at an age of three years, and is therefore of special importance for scenic effect. Height up to 25 feet, stems stout. It requires, like many allied plants, renewal after flowering.

Schizostachyum Hasskarlianum, Kurz.

Java. This and S. serpentinum afford the best kinds of Bamboo vegetables for cookery, the young shoots, when bursting out of the ground, being used for the purpose. Kurz mentions as culinary "Rebong" Bamboos: Gigantochloa aspera, G. robusta, G. maxima, G. atter. For ornamental culture the

same meritorious writer singles out Schizostachyum brachycladum, the varieties of Bambusa vulgaris, with gaudy, glossy colouring of the stems, in contrast with the black-stemmed species of Phyllostachys from China and Japan.

Schizostachyum irratum, Steudel.

Sunda Islands and Moluccas. Stems to 30 feet high, remarkably slender.

Schizostachyum Zollingeri, Steudel.

Hills of Java. Much cultivated. Height up to 35 feet, stems slender.

Schkuhria abrotanioides, Roth.

From Peru to Argentina. This annual herb yields locally an insecticidal powder.

Schoenocaulon officinale, A. Gray. (*Asa Graya officinalis,* Lindley; *Sabadilla officinalis*, Brandt and Dierbach.)

Mountains of Mexico. A bulbous-rooted herb with leafless stem, thus far specially distinct from any Veratrum. It furnishes the Sabadilla seeds and yields two alkaloids, veratrin and sabadillin; a resinous substance, helonin; also sabadillic and veratric acid. The generic names adopted for this plant by Lindley and by Lierbach are coetaneous.

Sciadopitys verticillata, Siebold.

The lofty and curious Umbrella Fir of Japan, 140 feet high, pyramidal in habit. Resists severe frosts. Wood white and compact.

Scilla esculenta, Ker. (*Camassia esculenta,* Lindley.)

The Quamash. In the western extra-tropical parts of North America, on moist prairies. The onion-like bulbs in a roasted state form a considerable portion of the vegetable food on which the aboriginal tribes of that part of the globe are living. It is a pretty plant and might be naturalised on moist meadows.

Scleracbne cyathopoda, F. v. Mueller.

Tropical and sub-tropical Australia. A perennial grass, valuable according to Mr. P. O'Shanesy for green feed, yielding a large return.

Scorzonera crocifolia, Sibthorp.

Greece. A perennial herb; the leaves, according to Dr. Heldreich, used there for a favourite salad and spinach.

Scorzonera deliciosa, Guasson.*

Sicily. One of the purple-flowered species; equal, if not superior, in its culinary use to the allied Salsify.

Scorzonera Hispanica, Linné.*

Middle and South Europe, Orient. The perennial root of this yellow-flowered herb furnishes not only a wholesome and palatable food, but also serves as a therapeutic remedy much like dandelion. Long boiling destroys its medicinal value. Some other kinds of Scorzonera may perhaps be drawn into similar use, there being many Asiatic species.

Scorzonera tuberosa, Pallas.

On the Volga and in Syria. This species also yields an edible root, and so perhaps the Chinese Sc. albicaulis (Bunge), the Persian Sc. Scowitzii (Cand.), the North African Sc. undulata (Vahl.), the Greek Sc. ramosa (Sibth.), the Russian Sc. Astrachanica (Cand.), the Turkish Sc. semicana (Cand.), the Iberian Sc. lanata (Bieberst.). At all events, careful culture may render them valuable esculents.

Scutia Indica, Brogniart.

South Asia. This, on Dr. Cleghorn's recommendation, might be utilised as a thorny hedge-shrub.

Sebæa ovata, R. Brown.

Extra-tropical Australia and New Zealand. This neat little annual herb can be utilised for its bitter tonic principle (Gentian-bitter). S. albidiflora (F. v. M.) is an allied species from somewhat saline ground. These plants disseminate themselves most readily.

Secale cereale, Linné.*

The Rye. Orient, but perhaps wild only in the country between the Caspian and Black Seas. Mentioned here as the hardiest of all grain plants for the highest Alpine regions. There are annual and biennial varieties, while a few allied species, hitherto not generally used for fodder or cereal culture, are perennial. The Rye, though not so nutritious as wheat, furnishes a most wholesome well-flavoured bread, which keeps for many days, and is most extensively used in Middle

and North Europe and Asia. The grain, moreover, can be reared in poor soil and cold climates, where wheat will no longer thrive. In produce of grain, Rye is not inferior to wheat in colder countries, while the yield of straw is larger, and the culture less exhaustive. It is a hardy cereal, not readily subject to disease, and can be grown on some kinds of peaty or sandy or moory ground. The sowing must not be effected at a period of much wetness. Wide sand tracts would be uninhabitable if it were not for the facility to provide human sustenance from this grateful corn. It dislikes moist ground. Sandy soil gives the best grain. It is a very remarkable fact that since ages in some tracts of Europe, Rye has been prolifically cultivated from year to year without interruption. In this respect Rye stands favourably alone among alimentary plants. It furnishes in cold countries also the earliest green fodder, and the return is large. Dr. Sonder, observed, in cultivated turf-heaths with much humus, that the spikelets produce three or even four fertile florets, and thus each spike will yield up to eighty beautiful seeds. Langethal recommends for argillaceous soils a mixture of early varieties of wheat and rye, the united crops furnishing grain for excellent bread. When the Rye-grain becomes attacked by Cordyceps purpurea (Fr.), or very similar species of fungi, then it becomes dangerously unwholesome, but then also a very important medicinal substance—namely, Ergot—is obtained. The biennial Wallachian variety of Rye can be mown or depastured prior to the season of its forming grain. In Alpine regions Wallachian Rye is sown with pine-seeds, for shelter of the pine seedlings in the first year.

Secale creticum, Linné.

Though probably only a veriety of S. cereale (L.), it deserves specially to be mentioned as furnishing a bread of peculiar taste.

Sechium edule, Swartz.

West India. The Chocho or Chayota. The large starchy root of this climber can be consumed as a culinary vegetable, while the good-sized fruits are also edible. The fruit often germinates before it drops. The plant bears already in the first year and may ripen one hundred fruits in a year. The roots are starchy. The plant comes to perfection in the warmer parts of the temperate zone.

Selinum anesorrhizum, F. v. Meller. (*Anesorrhiza Capensis*, Ch. and Schl.)

South Africa. The root of this biennial herb is edible. A.

montana (Eckl. and Zeyh.), a closely allied plant, yields likewise an edible root; and so it is with a few other species of the section Anesorrhiza.

Selinum Monnieri, Linné.

From East Asia now extending to South Europe, preferring moist places. An annual herb, praised by the Chinese as valuable for medicinal purposes.

Sequoia sempervirens, Endlicher.* (*Taxodium sempervirens,* Lambert.)

Red Wood or Bastard Cedar of North-West America, chiefly California. A splendid tree, 360 feet high, occasionally with a diameter of the stem of 55 feet. The wood is reddish, close-veined, easily split, very durable, but light and brittle. The timber of mission buildings one hundred years old is still quite sound. One of the most colossal trees of the globe. Its growth is about 32 feet in sixteen years. Often found on metamorphic sandstone. Dr. Gibbons writes that this tree forms immense forests along the coast range for a distance of about 200 miles in a belt 20 miles wide. The soft, straight-grained, durable wood is suitable for external as well as internal finish. It constitutes almost the sole material for weather-boarding along the Californian coast; and for fence posts, foundations of buildings, and railway sleepers, it is almost the only material used. Dr. Gibbons records as the stoutest stem some of 33 feet diameter at 3 feet from the ground.

Sequoia Wellingtonia, Seemann.* (*Wellingtonia gigantea,* Lindley; *Sequoia gigantea,* Torrey, not Endl.)

Mammoth Tree. California, up to 8,000 feet above the sea. This, the biggest of all trees, attains a stem of 320 feet in length and 112 feet in circumference, the oldest trees being estimated at 1,100 years. The total height of a tree has been recorded as occasionally 450 feet, but such heights have never been confirmed by actual clinometric measurements of trees existing now. A stem broken at 300 feet had yet a diameter of 18 feet. The wood is soft and white when felled; afterwards it turns red. It is very durable. Traditional accounts seem to have overrated the height of the Mammoth Tree. In the Calaveras grove two of the largest trees, which may have been the tallest of all, were destroyed; the two highest now existing there are respectively 325 and 319 feet high, with a circumference of 45 and 40 feet at 6 feet from the ground. At the Mariposa grove the highest

really measured trees are 272, 270, and 260 feet high, but one of these has the enormous circumference of 67 feet at 6 feet from the ground, while another, the height of which is not recorded, is 93 feet in girth at the ground and 64 feet at 11 feet from it; the branches of this individual tree are as thick as the stems of large Elms. The height of the Calaveras-grove is 4,760 feet above sea-level. According to Dr. Gibbons this giant of the forest has a far wider range than was formerly supposed, Mr. John Muir having shown that it stretches over nearly 200 miles at an altitude of 5,000 to 8,000 feet. From the Calaveras to the King River it occurs in small and isolated groves, but from the latter point south to Deer Creek, a distance of about 70 miles, there are almost unbroken forests of this noble tree. Growth of the tree about 2 feet a year under ordinary culture, much more in damp forest glens. Both Sequoias produce shoots from the root after the stem is cut away.

Sesamum Indicum, Linné.

The Gingili. Southern Asia, extending eastwards to Japan. This annual herb is cultivated as far as 42° north latitude in Japan. The oil, fresh expressed from the seeds, is one of the best for table use; free of any unpleasant taste. It congeals with more difficulty than olive oil. There are varieties of this plant with white, red, and black seeds; the latter is the earliest and richest, but gives a darker oil. Yield 45 to 50 per cent. oil. Nearly a million acres are under cultivation with this plant in the Madras Presidency. The export of the oil from Bangkok in 1870 was valued, according to Simmonds, at £183,000; the market value is from 25 to 35 shillings per cwt. The plant succeeds still at Malta and at Gaza, and is much grown in Turkey. Parched and pounded, the seeds make a rich soup. In Greece the seeds are often sprinkled over cakes. One of the advantages of the culture of this plant consists in its quick return of produce. The soot of the oil is used for China-ink.

Sesbania aculeata, Persoon.

The Danchi. Intra tropical and sub-tropical Asia, Africa, and Australia. This tall annual plant has proved adapted for desert regions. It yields a tough fibre for ropes, nets, and cordage, valued at from £30 to £40 for the ton. Several congeneric plants can be equally well utilised.

Sesbania Ægyptiaca, Persoon.

Africa, South Asia, North Australia. The foliage of this tall

perennial herb and of the allied annual S. brachycarpa (F. v. M.) serves as fodder, which cattle are ravenously fond of. According to Mr. T. Gulliver, the green pods, as well as the seeds, are nutritious, wholesome, and of pleasant taste. Roxburgh mentions the leaves and young pods of S. grandiflora as excellent for spinach.

Sesbania cannabina, Persoon.

South Asia. An annual herb of easy growth in wet localities, requiring less attention in weeding and otherwise than the Jute plant. The crop for fibre ripens in about five months.

Sesleria coerulea, Arduino.*

Most parts of Europe. Of this perennial grass Lengethal observes that it is for dry and loose limestone what Elymus arenarius is for loose sand. It stands well depasturing by sheep, and is one of the earliest grasses in the season. S. dactyloides, Nuttall (Buchloa dactyloides, Torrey), is the Buffalo Grass of Kansas.

Sesuvium Portulacastrum, Linné.

All around the globe on the shores of tropical and sub-tropical countries, occurring naturally as far south as Port Jackson. A perennial creeping herb, fit to fix the sandy silt on the edges of sea-coasts.

Shepherdia argentea, Nuttall.

The Buffalo Berry. From the Missouri to Hudson's Bay. This bush bears red, acidulous, edible berries.

Shorea robusta, Gaertner.

The Sal Tree. India, up to 3,000 feet. It attains as a maximum a height of 150 and a girth of 25 feet. One of the most famed of Indian timber trees. Drs. Stewart and Brandis found it on sandstone, conglomerate, gravelly and shingly ground, where loose water-transmitting soils are mixed with a large portion of vegetable mould. The climatic conditions within a Sal area may be expressed as—mean annual rainfall, 40 to 100 inches; mean temperature, in the cool season 55° to 77°, in the hot season 77° to 85° F. Sal will stand the occasional sinking of the temperature below freezing point. The heart wood is dark brown, coarse-grained, hard, very heavy, strong, tough, with fibrous cross-structure, the fibres interlaced. For buildings, river boats, and railway sleepers it is the

most important timber of North India. It exudes a pale, aromatic, dammer-like resin. The Tussa silkworm derives food from this tree.

Shorea Talura, Roxburgh. (*S. laccifera*, Heyne.)

India, abounding in Mysore, where South European fruits prosper. On this tree also the Lac insect lives. It furnishes a peculiar dammer.

Sison Amomum, Linné.

Middle and South Europe. A herb of one or two years' duration. It grows best on soil rich in lime. The seeds can be used for condiment.

Smilax medica, Chamisso and Schlechtendal.

Mexico. This plant produces mainly the sarsaparilla root of that country.

Smilax officinalis, Humboldt.

New Granada and other parts of Central America. This climbing shrub produces at least a portion of the Columbian sarsaparilla.

Smilax papyracea, Duhamel.

Guiana to Brazil. The origin of the principal supply of Brazilian sarsaparilla is ascribed to this species, although several others of this genus, largely represented in Brazil, may yield the medicinal root also. In warm humid gullies of the temperate zone these plants would likely succeed in establishing themselves. Smilax Australis (R. Br.) extends from the tropical coast parts of Australia to East Gippsland. Neither this nor the East Australian S. glycyphylla (Smith) nor the New Zealand Ripogonum scandens (Forst.) have ever been subjected to accurate therapeutic tests, and the same may be said of numerous other Smilaces scattered through the warmer countries of the globe. The Italian sarsaparilla, which is derived from the Mediterranean S. aspera (L.), has been introduced into medicine.

Smilax rotundifolia, Linné.

Eastern States of North America and Canada. A prickly climber with deciduous foliage. An immense local use is made of the roots for the bowls of tobacco-pipes, clay pipes being there almost unknown. It is estimated that nearly three millions of these briar-root pipes are now made a year.

perennial herb and of the allied annual S. brachycarpa (F. v. M.) serves as fodder, which cattle are ravenously fond of. According to Mr. T. Gulliver, the green pods, as well as the seeds, are nutritious, wholesome, and of pleasant taste. Roxburgh mentions the leaves and young pods of S. grandiflora as excellent for spinach.

Sesbania cannabina, Persoon.

South Asia. An annual herb of easy growth in wet localities, requiring less attention in weeding and otherwise than the Jute plant. The crop for fibre ripens in about five months.

Sesleria coerulea, Arduino.*

Most parts of Europe. Of this perennial grass Lengethal observes that it is for dry and loose limestone what Elymus arenarius is for loose sand. It stands well depasturing by sheep, and is one of the earliest grasses in the season. S. dactyloides, Nuttall (Buchloa dactyloides, Torrey), is the Buffalo Grass of Kansas.

Sesuvium Portulacastrum, Linné.

All around the globe on the shores of tropical and sub-tropical countries, occurring naturally as far south as Port Jackson. A perennial creeping herb, fit to fix the sandy silt on the edges of sea-coasts.

Shepherdia argentea, Nuttall.

The Buffalo Berry. From the Missouri to Hudson's Bay. This bush bears red, acidulous, edible berries.

Shorea robusta, Gaertner.

The Sal Tree. India, up to 3,000 feet. It attains as a maximum a height of 150 and a girth of 25 feet. One of the most famed of Indian timber trees. Drs. Stewart and Brandis found it on sandstone, conglomerate, gravelly and shingly ground, where loose water-transmitting soils are mixed with a large portion of vegetable mould. The climatic conditions within a Sal area may be expressed as—mean annual rainfall, 40 to 100 inches; mean temperature, in the cool season 55° to 77°, in the hot season 77° to 85° F. Sal will stand the occasional sinking of the temperature below freezing point. The heart wood is dark brown, coarse-grained, hard, very heavy, strong, tough, with fibrous cross-structure, the fibres interlaced. For buildings, river boats, and railway sleepers it is the

most important timber of North India. It exudes a pale, aromatic, dammer-like resin. The Tussa silkworm derives food from this tree.

Shorea Talura, Roxburgh. (*S. laccifera,* Heyne.)

India, abounding in Mysore, where South European fruits prosper. On this tree also the Lac insect lives. It furnishes a peculiar dammer.

Sison Amomum, Linné.

Middle and South Europe. A herb of one or two years' duration. It grows best on soil rich in lime. The seeds can be used for condiment.

Smilax medica, Chamisso and Schlechtendal.

Mexico. This plant produces mainly the sarsaparilla root of that country.

Smilax officinalis, Humboldt.

New Granada and other parts of Central America. This climbing shrub produces at least a portion of the Columbian sarsaparilla.

Smilax papyracea, Duhamel.

Guiana to Brazil. The origin of the principal supply of Brazilian sarsaparilla is ascribed to this species, although several others of this genus, largely represented in Brazil, may yield the medicinal root also. In warm humid gullies of the temperate zone these plants would likely succeed in establishing themselves. Smilax Australis (R. Br.) extends from the tropical coast parts of Australia to East Gippsland. Neither this nor the East Australian S. glycyphylla (Smith) nor the New Zealand Ripogonum scandens (Forst.) have ever been subjected to accurate therapeutic tests, and the same may be said of numerous other Smilaces scattered through the warmer countries of the globe. The Italian sarsaparilla, which is derived from the Mediterranean S. aspera (L.), has been introduced into medicine.

Smilax rotundifolia, Linné.

Eastern States of North America and Canada. A prickly climber with deciduous foliage. An immense local use is made of the roots for the bowls of tobacco-pipes, clay pipes being there almost unknown. It is estimated that nearly three millions of these briar-root pipes are now made a year.

The reed portion of these pipes is generally prepared from Alnus serrulata (Meehan).

Smyrnium Olusatrum, Linné.

The Alisander. Middle and South Europe, North Africa, Western Asia. A biennial herb, which, raw or boiled, can be utilised in the manner of celery. The roots and the fruitlets serve medicinal purposes.

Solanum Æthiopicum, Linné.

Tropical Africa. Cultivated there and elsewhere on account of its edible berries, which are large, red, globular, and uneven. The plant is annual.

Solanum betaceum, Cavanilles. (*Cyphomandra betacea,* Sendtner.)

Central America. This shrub is cultivated as far south as Buenos Ayres and Valparaiso, also on the Mediterranean Sea, for the sake of its tomato-like berries.

Solanum Dulcamara, Linné.

Middle and South Europe, North Africa, Middle Asia. A trailing half-shrub, with deciduous leaves. The stems are used in medicine and contain two alkaloids—dulcamarin and solanin.

Solanum edule, Schumacher and Thonning.

Guinea. The berry is of the size of an apple, yellow and edible.

Solanum Fendleri, Asa Gray.

New Mexico. A new kind of Potato, enduring a temperature of zero. Professor Meehan's endeavours to obtain good-sized tubers have as yet not been successful. Tubers of good size have since been obtained according to Simmonds. The following plants are also spoken of by Dr. Rosenthal and others as new kinds of potato, perhaps to be developed through cultivation: S. demissum (Lindley), S. cardiophyllum (Lindley), S. utile (Klotzsch), S. verrucosum (Schlechtendal), S. Bulbocastanum (Dunal), S. stoloniferum (Schlechtendal), all from Mexico and some from elevations 10,000 feet high; S. Maglea (Molina) from Chili, and S. immite (Dunal) from Peru.

Solanum Gilo, Raddi.

Tropical America; much cultivated there for the sake of its large, spherical, orange-coloured berries, which are eatable.

Solanum Guinense, La Marck.

Within the tropics of both hemispheres. The berries of this shrub serve as a dye of various shades, particularly violet, for silk.

Solanum indigoferum, St. Hilaire.

Southern Brazil. A dye-shrub, deserving trial culture.

Solanum Lycopersicum, Linné. (*Lycopersicum esculentum,* Mill.)

The Tomato. South America. Annual. Several varieties exist, differing in shape and colour of the berries. It is one of the most eligible plants with esculent fruits for naturalisation in desert country. As well known, the Tomato is adapted for various culinary purposes. Tomato foliage can be placed round fruit trees, like the equally poisonous potato leaves, to prevent the access of insects, and an infusion of the herb serves also as an insecticide for syringing, as first adopted by Mr. Sircy.

Solanum macrocarpum, Linné.

Mauritius and Madagascar. A perennial herb. The berries are of the size of an apple, globular and yellow. S. Thonningi (F. Jacq.), from Guinea, is a nearly-related plant. S. calycinum (Moc. et Sess.), from Mexico, is also allied.

Solanum Melongena, Linné. (*S. ovigrum,* Dunal; *S. esculentum,* Dunal.)

The Egg Plant. India and some other parts of tropical Asia, A perennial plant, usually renewed in cultivation like an annual. The egg-shaped large berries are known under the name of Aubergines or Bringals or Begoons as culinary esculents. Allied plants are S. insanum (L.), S. longum (Roxb.), S. serpentinum (Desf.), S. undatum (Lam.), S. ferox (L.), S. pseudo-saponaceum (Blume), S. album (Dour.), which all bear large berries, considered harmless, but may not all represent well-marked species. Absolute ripeness of all such kinds of fruits is an unavoidable requisite, as otherwise even wholesome sorts may prove acrid or even poisonous. Probably many other of the exceedingly numerous species of the genus Solanum may be available for good-sized edible berries.

Solanum muricatum, L'Heritier.

The Pepino of Peru. A shrubby species with egg-shaped edible berries, which are white with purple spots, and attain a length of 6 inches.

Solanum Quitoense, La Marck.

Ecuador, Peru. A shrubby plant. The berries resemble small oranges in size colour, and taste, and are of a peculiar fragrance. To this the S. Plumierii (Dun.), from the West Indian Islands, is also cognate, and the S. Topiro (Kunth), from the Orinoco.

Solanum torvum, Swartz.

From West India to Peru. A shrubby species with yellow spherical berries of good size, which seem also wholesome. Other species from tropical America have shown themselves sufficiently hardy for inducing us to recommend the test culture of such kinds of plants. Many of them are highly curious and ornamental.

Solanum tuberosum, Linné.*

The Potato. Andes of South America, particularly of Chili, but not absolutely trans-equatorial, as it extends into Columbia. It is also wild in the Argentine territory. As a starch plant, the Potato interests us on this occasion particularly. Considering its prolific yield in rich soil, we possess as yet too few factories for potato starch. The latter, by being heated with mineral acids or malt, can be converted into dextrin and dextro-glucose for many purposes of the arts. Dextrin, as a substitute for gum, is also obtainable by subjecting potato-starch in a dry state to a heat of 400° F. Alcohol may be largely produced from the tubers. The berries and shoots contain solanin. Baron von Liebig remarks, "So far as its foliage is concerned, it is a lime plant; as regards its tuber, a potash plant." Langethal says, "It surpasses in easy range of cultivation all other root crops. Its culture suppresses weeds and opens up the soil, besides preparing the land for cereals." Seeds of the Potato berries should be sown in adapted places by explorers of new countries. The most formidable potato disease of the last thirty years from the Peronospora infestans seems to have originated from the use of objectionable kinds of guano, with the introduction of which the murrain was contemporaneous.

Solanum Uporo, Dunal.

In many of the islands of the Pacific Ocean. The large, red, spherical berries of this shrub can be used like Tomato. Proved hardy at Port Phillip.

Solanum vescum, F. v. Mueller.

The Gunyang. South-East Australia. A shrub yielding edible

berries, which need, however, to be fully ripe for securing absence of deleterious properties.

Solanum xanthocarpum, Schrader and Wendland.

North Africa and South Asia. A perennial herb. The berries are of the size of a cherry, and either yellow or scarlet.

Sophora Japonica, Linné.*

A deciduous tree of China and Japan, resembling the Laburnum, up to 60 feet high; wood hard and compact, valued for turners' work. All parts of the plant purgative; the flowers rich in yellow dye, used for silk.

Sophora tetraptera, Aiton. (Var. *Macnabiana,* Graham.

The Pelu of Chili and Patagonia. A small tree with exceedingly hard and durable wood, much used for cog-wheels and similar structures. The wood differs much from that of S. Toramiro of the Easter Island (Dr. Philippi).

Spartina cynosuroides, Willdenow.

Eastern part of North America. A perennial grass of freshwater swamps, there often called Prairie Grass; it can be utilised for fodder, and its value as paper material seems equal to that of Esparto.

Spartina juncea, Willdenow.

Salt marshes of North America. A grass with creeping roots; it can be utilised to bind moist sand on the coast. A tough fibre can readily be obtained from the leaves. S. polystachya (W.) is a stately grass, adapted for saline soil.

Spartina stricta, Roth.

Countries on the Mediterranean Sea, extending to Britain and also to North America. The Twin-piked Cord Grass. A rigid perennial with creeping roots, recommended for fixing and rendering solid any mud flats on low shores and at the mouths of rivers; only suitable for brackish ground.

Spartium junceum, Linné.

Countries around the Mediterranean Sea. The flowers of this bush provide a yellow dye. A textile fibre can be separated from the branches.

Spergula arvensis, Linné.

All Europe, North Africa, West Asia. This annual herb,

though easily becoming a troublesome weed, is here mentioned for the desirable completeness of this enumeration. The tall variety with large seeds (S. maxima, Weihe) can be chosen with advantage for the commencement of tillage on any sandy soil too poor for barley. It takes up the land only for about two months, if grown for green fodder, and increases much the yield of milk. It serves also for admixture to hay (Langethal).

Spigelia Marylandica, Linné.

The Pinkroot of North America, north to Pennsylvania and Wisconsin. A perennial handsome herb, requiring as a vermifuge cautious administration. S. anthelmia (L.) is an annual plant of tropical America and possesses similar medicinal properties, in which probably other species likewise share.

Spilanthes oleracea, N. Jacquin.

The Para Cress. South America. An annual herb of considerable pungency, used as a medicinal salad.

Spinacia oleracea, Linné.

Siberia. The ordinary Spinach, an agreeable culinary annual of rapid growth. It is of a mild aperient property. Two varieties are distinguished, the Summer and the Winter Spinach, the former less inclined to run into seed, but also less hardy.

Spinacia tetrandra, Stev.

Caucasus. Also annual and unisexual like the preceding plant, with which it has equal value, though it is less known.

Spinifex hirsutus, Labillardière.

On the whole coast of extra-tropical Australia. Highly valuable for binding coast-sand with its long creeping roots.

Spinifex longifolius, R. Brown.

On the tropical and western extra-tropical coast of Australia. Available like the former.

Spinifex squarrosus, Linné.

India. Useful, like the two preceding plants. Tennant remarks that the radiating heads become detached when the seed is matured, and are carried by the wind along the sand, over the surface of which they are impelled by their elastic

spines, dropping their seeds as they roll along. The heads are so buoyant as to float lightly on water, and while the uppermost spiny rays are acting as sails, they are carried across narrow estuaries to continue the process of embanking beyond on any newly-formed sandbars.

Spondias dulcis, G. Foster.

Fiji, Tongan, and Society Islands. This noble tree is introduced into this list to indicate that trials should be instituted as regards the culture of the various good fruit-bearing species of this genus, one of which, S. pleiogyna (F. von. Mueller), transgresses in East Australia the tropical circle. The lamented Dr. Seemann saw S. dulcis 60 feet high, and describes it as laden with fruit of agreeable apple-flavour called Rewa, and attaining over 1 lb. weight.

Sporobus virginicus, R. Brown.

Jamaica. Will luxuriate even in sandy maritime places, and keep perfectly green after three or four months' drought. Horses become rapidly and astonishingly fat in feeding upon it (Tenman). S. Indicus and S. purpuraceus and S. Jacquemonti are also highly spoken of as pasture grasses in the West Indian Islands.

Stenotaphrum Americanum, Schranck. (*S. glabrum,* Trinius.)

South Asia, Africa, warmer countries of America; not known from any part of Europe or Australia. Here called the Buffalo Grass. It is perennial, creeping, and admirably adapted for binding sea-sand and river banks, also for forming garden edges, and for establishing a grass sward on lawns much subjected to traffic; it is, besides, of some value as pasture. It was this grass which Mr. John C. Bell reared with so much advantage for fodder on the bare rocks of the Island of Ascension, and it was there where Australian Acacias took the lead to establish wood vegetation and for securing permanency of drinking-water.

Sterculia Carthaginensis, Cavanilles. (*S. Chicka,* St. Hilaire.)

South Brazil. This and some other South American species furnish seeds of almond-like taste.

Sterculia monosperma, Ventenat. (*S. nobilis,* R. Brown.)

China. A middle-sized spreading tree. The large seeds can be used as chestnuts in a roasted state.

Sterclia quadrifida, R. Brown.

Eastern and Northern Australia. This tree might be tried in rich and humid forest regions. It is the "Calool" of the natives. The black seeds are of a filbert taste, like those of some other *Sterculiæ*. As many as eleven of the brilliant scarlet fruits may be in a cluster, and each of them may contain up to ten or eleven seeds.

Sterculia urceolata, Smith.

Moluccas. Possibly hardy. Seeds edible.

Sterculia urens, Roxburgh.

Coromandel. Seeds edible.

Stilbocarpa polaris, Decaisne and Planchon.

Auckland's and Campbell's Islands, and seemingly also in the southern extremity of New Zealand. A herbaceous plant with long roots, which are saccharine and served some wrecked people for a lengthened period as sustenance. The plant is recommended here for further attention, as it may prove through culture a valuable addition to the stock of culinary vegetables of cold countries.

Stipa aristiglumis, F. v. Mueller.

South-East Australia. Graziers consider this perennial grass as very fattening and yielding a large quantity of feed. Its celerity of growth is such that when it springs up it will grow at the rate of 6 inches in a fortnight. Horses, cattle, and sheep are extremely fond of it. It ripens seeds in little more than two months in favourable seasons.

Stipa tenacissima, Linné.* (*Macrochloa tenacissima,* Kunth.)

The Esparto or Atocha. Spain, Portugal, Greece, North Africa, ascending the Sierra Nevada to 4,000 feet. This grass has become celebrated since some years, having afforded already a vast quantity of material for British paper-mills. It is tall and perennial, and may prove a valuable acquisition, inasmuch as it lives on any kind of poor soil, occurring naturally on sand and gravel as well as on clayey or calcareous or gypseous soil, and even on the very brink of the coast. Possibly the value of some Australian grasses allied to the Atocha may in a like manner become commercially established, and mainly with this view paper samples of several grass kinds were prepared by the writer (*vide* "Report, Industrial Exhibition, Melbourne, 1867").

Even in the scorching heat and the arid sands of the Sahara the Atocha maintains itself, and it may thus yet be destined to play an important part in the introduced vegetation of any arid places of desert tracts, particularly where lime and gypsum exist. The very tenacious fibre resists decay and is much employed for the manufacture of ropes, also for baskets, mats, hats, and other articles. During 1870 the import of Esparto ropes into England was 18,500 tons, while the raw material to the extent of about 130,000 tons was imported. Extensive culture of this grass has commenced in the south of France. It is pulled once a year, in the earlier part of the summer. The propagation can be effected from seeds, but is done usually by division of the root. Ten tons of dry Esparto, worth from £4 to £5 each, can under favourable circumstances be obtained from an acre. The supply has fallen short of the demand. Good writing-paper is made from Esparto without admixture; the process is similar to that for rags, but cleaner. The price of Esparto paper ranges from £40 to £50 for the ton. Stipa arenaria (Brot.) is a closely allied and still taller species, confined to Spain and Portugal. Consul W. P. Mark deserves great praise for having brought the Atocha into commercial and manufactural recognition. Stipa pennata, S. capillata, and S. elegantissima will grow in pure sand.

Streblus asper, Loureiro.

South Asia. This bears a good recommendation for live fences, in being a shrub of remarkable closeness of branches.

Styrax officinale, Linné.

Countries on the Mediterranean Sea. A tall bush or small tree. The fragrant solid storax resin exudes from this plant, or is particularly obtained by pressure of the bark.

Swertia Chirata, Bentham. (*Ophelia Chirata,* Grisebach.)

Widely dispersed over the higher mountain regions of India. A perennial herb, considered as one of the best of tonics; it possesses also febrifugal and antarthritic properties. Its administration in the form of an infusion prepared with cold water is the best. Besides O. elegans (Wight), some of the other Upper Indian, Chinese, and Japanese species deserve probably equal attention. Hanbury and Flückiger mention as chiratas or chirettas of Indian bazaars: Ophelia angustifolia (D. Don), O. densiflora (Grisebach), O. elegans (Wight), and O. multiflora (Dalzell), besides species of Exacum and Andrographis. All come from the cooler uplands.

Swietenia Mahagoni, Linné.

The Mahogany Tree of West India, extending naturally to Florida and Mexico. The degree of endurance of this famous tree is not sufficiently ascertained. In its native mountains it ascends to 3,000 feet.

Symphytum asperrimum, Sims.*

The Prickly Pomfrey. Caucasus. The growth of this hardy plant may be recommended as an adjunct to lupine culture. The Hon. Arthur Holroyd, of Sydney, has recently devoted a special publication to this plant. He quotes on good authority the return of foliage already in the first year as 20 tons to the acre, in the second year 50 tons, and every year after 80 to 120 tons on manured land. It yields a nutritive and relished forage in rapid and continuous reproduction. It is likewise recommended for green manure. Dr. Voelcker found much mucilage but little sugar in this plant. The massive root, known to penetrate to 9 feet depth, sustains the plant in vigour, admitting it to be cut almost throughout the year. The propagation is easy from root-cuttings, difficult from seeds, 4,000 of the former to an acre; it will thrive even in sand and tough clay, but prefers moist and even boggy land. In tropical countries cattle have a predilection for it; there it likes shade. The likewise borragineous Cynoglossum Morrisonii, D'Cand., of North America, yields three cuttings annually. Horses and cattle relish it. It ought to be naturalised along swamps, lagoons, and river banks. It can be dried for hay. Finally it is recommended as a plant for game.

Symphytum officinale, Linné.

The Comfrey. Europe, Western Asia. A perennial herb. The root is utilised in veterinary practice.

Symplocos ramosissima, Wallich.

Himalaya, up to 7,500 feet. In Sikkim, according to Dr. Stewart, the yellow silkworm is reared on the leaves of this tree. Two allied species occur spontaneously in the forests of East Australia.

Syncarpia laurifolia, Tenore.

Queensland and New South Wales. Vernacular name Turpentine Tree; attains a height of 200 feet, with a stem of great thickness. The wood is comparatively soft and brittle, but very durable, mostly used for flooring and cabinet-making, as it takes a high polish (Hartmann).

Tynoon glandulosum, A. de Jussieu.

New South Wales and South Queensland. This evergreen tree deserves cultivation in sheltered warm forest-valleys on account of its rose-coloured wood. Some species of Dysoxylon of East Australia produce also rosewood.

Tacca pinnatifida, G. Forster.

Sand-shores of the South Sea Islands. From the tubers of this herb the main supply of the Fiji arrowroot is prepared. It is not unlkely that this plant will endure a tempera te clime. The Tacca starch is much valued in medicine, and particularly used in cases of dysentery and diarrhœa. Its characteristics are readily recognised under the microscope. Several other kinds of Tacca are distinguished, but their specific limits are not yet well ascertained. Dr. Seemann admits two (T. maculata and T. Brownii) for tropical Australia, one of these extending as a hill plant to Fiji. From the leaves and flower-stalks light kinds of bonnets are plaited. A Tacca occurring in the Sandwich Islands yields a large quantity of the so-called arrowroot exported from thence. Other species (including those of Ataccia) occur in India, Madagascar, Guinea, and Guiana, all deserving tests in reference to their value as starch plants.

Tagetes glanduligera, Schranck.

South America. This vigorous annual plant is said by Dr. Prentice to be pulicifugous.

Talinum patens, Willdenow. (*T. paniculatum,* Gaertner.)

From Mexico to Argentina. A perennial succulent herb, which might easily be naturalised on coast rocks. It furnishes the "Puchero" vegetable.

Tamarindus Indica, Linné.

Tropical Asia and Africa. This magnificent, large, expansive tree extends northwards of Egypt, and was found by the writer of this list in North-Western Australia. Final girth of stem 25 feet not rare. Never leafless. Varieties occur, according to Brandis, with sweetish red pulp. It is indicated here, not without hesitation, to suggest trials of its acclimation in regions of the temperate zone with a warm, humid, and equable temperature. The acid pulp of the pods forms the medicinal Tamarind, rich in formic and butyric acid, irrespective of its other contents.

Tamarix dioica, Roxburgh.

India, up to 2,500 feet. An important shrub for binding newly-formed river banks, even in saline soil.

Tamarix Gallica, Linné.*

South Europe, North and tropical Africa, South Asia, ascending the Himalayas to 11,000 feet. Attains in Algeria, according to Cosson, a height of 30 feet. This shrub or small tree adapts itself in the most extraordinary manner to the most different localities. It will grow alike in water and the driest soil, also in salty ground, and is one of the most grateful and tractable plants in culture; it is readily multiplied from cuttings, which strike root as easily as a willow and push forth stems with unusual vigour. Hence it is one of the most eligible bushes for planting on coast sand to stay its movements, or for lining embankments. Furnishes material for a superior charcoal (W. H. Colvill). Planted much in cemeteries. In Australia, first largely sent out by the writer.

Tamarix Germanica, Linné.

Europe and West Asia, ascending to 15,000 feet in the Himalayas. Likewise available for arresting the ingress of shifting sand, particularly in moist places, also for solidifying precipitous river banks. The allied T. elegans (Myricaria elegans, Royle) attains a height of 20 feet.

Tamarix orientalis, Forskal. (*T. articulata,* Vahl.)

North and Middle Africa, South Asia. A fast-growing tree, attaining a height of 60 feet, the trunk occasionally expanding to a circumference of 12 feet. Springs up freely from seeds, and is also readily propagated from cuttings. Coppices well (Stewart and Brandis). The wood serves for ploughs, wheels, and many implements. Dye-galls and a kind of manna are also produced by this tree. The same, or an allied species, extends to Japan.

Tanacetum vulgare, Linné.

The Tansy. North and Middle Europe, North Asia, North-Western America. A perennial herb of well-known medicinal value, which mainly depends on its volatile oil.

Taraxacum officinale, Weber.

Dispersed over most of the temperate and cold parts of the globe, but apparently not a native of South-East Australia. This well-known plant is mentioned, as it can be brought

under regular cultivation to obtain the medicinal extract from its roots. It is also considered wholesome to grazing-animals. The young leaves furnish a medicinal salad. It is also an important honey plant and early in the season.

Tarchonanthus camphoratus, Linné.

South Africa. This bush deserves attention, being of medicinal value. As an odorous garden plant it is also very acceptable.

Taxodium distichum, Richard.*

Virginian Swamp or Bald Cypress. In swampy places of Eastern North America, extending from 38° to at least 17° north latitude. Thought to attain occasionally an age of 2,000 years. A large and valuable tree, 100 feet high, with a stem circumference of sometimes 40 feet; of rapid growth, with deciduous foliage, like that of the Larch and Ginkgo. It is found fossil in the miocene formation of many parts of Europe. The wood is fine-grained, hard, strong, elastic and durable, splits well, and thus much used for shingles, rails, and planks; it is almost indestructible in water. The tree requires a rich soil, a well-sheltered site, with much moisture and good drainage (Lawson). It yields an essential oil and a superior kind of turpentine. Useful for avenues on swampy margins of lakes or river banks. Porcher says, "This tree, lifting its giant form above the others, gives a striking feature to many of the swamps of Carolina and Georgia; they seem like watch-towers for the feathered race."

Taxodium mucronatum, Teno.

The famed Montezuma Cypress of Mexico, 120 feet high, with a trunk 44 feet in circumference; it forms extensive forests between Chapultepec and Tescuco.

Taxus baccata, Linné.

Yew. Middle and South Europe and Asia, at 1,000 to 10,000 feet elevation. Generally a shrub, sometimes a tree 100 feet high, which furnishes a yellow or brown wood, exceedingly tough, elastic and durable, and much esteemed by turners; one of the best of all woods for bows. Simmonds observed that "a post of Yew will outlast a post of iron." Much esteemed for pumps, piles, water-pipes, as more lasting than any other wood; also for particular musical instruments, the strongest axletrees, etc. (Simmonds). The tree is of very slow growth, and attains a great age, perhaps several thousand years; some ancient ones are known with a stem of 50 feet

in girth. It should be kept out of the reach of grazing-animals, as leaves and fruit are deadly poisonous.

Taxus brevifolia, Nuttal. (*T. Lindleyana,* Lawson.)

North-West America. Western Yew. A stately tree, 75 feet high, with a stem of 5 feet in circumference. Wood beautifully white or slightly yellow, as fine and close-grained as the European Yew. The Indians use it for their bows.

Tectona grandis, Linné fil.

The Teak of South Asia. This superb timber tree has its northern limit in Bandalkhand, at elevations of 3,000 feet, ascending to 4,000 feet; but then not of tall size. In Western India, according to Stewart and Brandis, frost is not uncommon in the teak districts. Teak wood is held in the highest esteem by ship-builders; also used by cabinet-makers, for the panels of coaches, etc. It scarcely shrinks.

Teinostachyum attenuatum, Munro.

The hardy Bamboo of Ceylon, there growing on the mountains at elevations between 4,000 to 6,000 feet. It attains a height of 25 feet.

Telfairia pedata, Hooker.

Mozambique. A cucurbitaceous climber with perennial stems, attaining a length of 100 feet, with fringed lilac flowers of extraordinary beauty, and with fruits attaining a weight of 60 lbs. and containing at times as many as 500 large seeds. The latter in a boiled state are eatable, or a large quantity of oil can be pressed from them. The root is fleshy. A second huge species of similar use, T. occidentalis (J. Hook.), occurs in Guinea.

Terfezia leonis, Tulasne.

South Europe, North America. This edible Truffle, together with other species of this and other genera, is deserving of naturalisation.

Terminalia Buceras, J. Hooker. (*Bucida Buceras,* Linné.)

From the Antilles to Brazil. One of the Mangrove trees, thus living in salt water. Possibly hardy and calculated to consolidate mud shores. The Tussa silkworm inhabits, among other trees, several Terminalias.

Terminalia Catappa, Linné.

India, ascending mountain regions. Few trees, as stated by Roxburgh, surpass this in elegance and beauty. We have yet to learn whether it can be naturalised in temperate climes, which it especially deserves for its nuts. Several species extend in East Australia to sub-tropical latitudes. The seeds are almond-like, of filbert taste and wholesome. The astringent fruits of several other species form an article of trade, sought for a lasting black dye. T. parviflora (Thwaites) forms a large tree in Ceylon, at elevations up to 4,000 feet.

Terminalia Chebula, Retzius.

On the drier mountains of India. The seeds of this tree are of hazel taste; the galls of the leaves and also the young fruits, known as Myrobalams, serve for superior dye and tanning material. Some other congeners serve the same purpose.

Tetragonia expansa, Murray.

The New Zealand Spinach, occurring also on many places of the coast and in the desert interior of Australia. Known also from New Caledonia, China, Japan, and Valdivia. An annual herb, useful as a culinary vegetable, also for binding drift-sand.

Tetragonia implexicoma, J. Hooker.

Extra-tropical Australia, New Zealand, Chatham Island. A frutescent, widely expanding plant, forming often large natural festoons, or trailing and climbing over rocks and sand, never away from the coast. As a Spinach plant it is as valuable as the succeeding species. It is well adapted for the formation of bowers in arid places; it helps also to bind sand. T. trigyna (Banks and Solander) seems identical.

Tetranthera Californica, Hooker and Arnott.* (*Oreodaphne Californica,* Nees.)

Oregon and California, where it is called the Mountain Laurel or Bay Tree. On the banks of rivers attaining a height of 100 feet, throughout pervaded by a somewhat camphoric odour. Wood hard, close-grained, durable, susceptible of a high polish, easily worked, used for superior flooring, turnery, and manifold other select work. The tree is easily cultivated, but not of quick growth (Dr. Behr and Prof. Solander).

Tetranthera calophylla, Miquel. (*Cylicodaphne sebifera,* Blume.)

Mountains of Java and the Neilgherries. From the kernels of the berries a tallow-like fat is pressed for the manufacture

of candles. The yield is comparatively large. Trial cultures with this tree might be instituted in humid forest valleys. T. laurifolia (Jacq.), of tropical Asia and Australia, and T. japonica (Sprengel), are noted as similarly utilitarian.

Teucrium Marum, Linné.

Countries on the Mediterranean Sea. A small somewhat shrubby plant, in use for the sake of its scent, containing a peculiar stearopten. T. Scordium (L.) from Europe and Middle Asia, T. Chamaedrys (L.), T. Polium (L.), and T. Creticum (L.) from South Europe, are occasionally drawn into medical use. All these, together with many other species from various countries, are pleasantly odorous.

Thapsia edulis, Bentham. (*Monizia edulis,* Lowe.)

On the Island of Deserte Grande, near Madeira, where it is called the Carrot Tree. It might be of some use to bring this almost shrubby umbellate to the cliffs of our shores; though the root is inferior to a carrot, perhaps cultivation would improve it. T. decipiens, Benth. (Melanoselinum decipiens, Lowe), from Madeira, is of palm-like habit and desirable for scenic effects in plant-grouping.

Theligonum cynocrambe, Linné.

Countries around the Mediterranean Sea. An annual Spinach plant of somewhat aperient effect.

Thouarea sarmentosa, Persoon.

Tropical shores of the eastern hemisphere. This curious and tender grass might be easily introduced, to help binding the sand on sea-beaches.

Thrinax parviflora, Swartz.

South Florida, West India, and also on the continent of Central America. The stem of this Fan Palm attains a height of 25 feet, or according to Chapman 40 feet, but extremely slender. It belongs to the sand tracts of the coast and may endure a temperate clime. The fibre of this Palm forms material for ropes. T. argentea (Lodd.) is a closely allied Palm. The few other species of the genus deserve also trial culture.

Thuya gigantea, Nuttall.

North-West America, on the banks of the Columbia River. The Yellow Cypress of the colonists, also known as Oregon Red Cedar. A straight graceful tree 200 feet high, in some

instances known to have attained even a height of 325 feet, with a stem 22 feet in diameter; furnishing a valuable building-timber of a pale or light-yellow colour, known as the Oregon White Cedar-wood, susceptible of high polish. It is light, soft, smooth and durable, and makes the finest sashes, doors, mouldings, and similar articles (Vasey). Canoes carrying four tons have been obtained out of one stem. The bast can be converted into ropes and mats. The tree can be trained into hedges and bowers.

Thuya occidentalis, Linné.

North America, particularly frequent in Canada. Northern White Cedar, or Arbor vitæ. A fine tree, 70 feet high; the wood is reddish or yellowish, fine-grained, very tough and resinous, light, soft, and well fit for building, especially for water-work; also for turnery and machinery. Michaux mentions that posts of this wood last forty years; a house built of it was found perfectly sound after sixty years. It prefers moist soil. Valuable for hedge copses; it can also be trained into garden bowers. Porcher says that it makes the finest ornamental hedge or screen in the United States, attaining any required height and being very compact and beautiful; such hedges, indeed, were observed by the writer himself many years ago in Rio de Janeiro. The shoots and also an essential oil of this tree are used in medicine; the bast can be converted into ropes. The branches serve for brooms.

Thuyopsis dolabrata, Siebold and Zuccarini.

Japan. A majestic tree, of conical shape and drooping habit, 50 feet high, attaining a stem 3 feet in diameter. It delights in shaded and rather moist situations, used in China and Japan for avenues. Quite hardy in England (Hoopes). It *furnishes an excellent hard timber of a red colour.*

Thymelæa tinctoria, Endlicher. (*Passerina tinctoria,* Pourr.)

Portugal, Spain, South France. A small shrub. It yields a yellow dye. Cursorily it may be noted here that some of the Australian Pimelæ contain a blue pigment, which has not yet been fully tested. Their bark produces more or less of daphnin and of the volatile acrid principle for which the bark of Daphne Mezereum (L.) is used. These are remarkably developed in the Victorian Pimelea stricta (Meissn.). The bark of many is also pervaded by a tough fibre, that of the tall Pimelea clavata (Labill.), a West Australian bush, being particularly tenacious, and used for whips.

Thymus capitatus, Hoffmann and Link. (*Satureja capitata*, Linné).

Around the whole Mediteranean Sea. Since the times of Hippocrates, Theophrastos, and Galenus, this small scented shrub has been employed in medicine.

Thymus Mastichina, Linné.

Spain, Portugal, Morocco. A half-shrub of agreeable scent, used also occasionally in medicine.

Thymus Serpillum, Linné.

Europe, Western Asia. A perennial herb of some medicinal value. It would live on the highest Alps. An essential oil can be obtained from it. One particular variety is lemon-scented.

Thymus vulgaris, Linné.

The Garden Thyme. South Europe. This small shrubby plant is available for scent and for condiments. It is also well adapted for forming garden-edges. The essential oil of this plant can be separated into the crystalline thymol aud the liquid thymen and cymol. T. aestivus (Ruet.) and T. hiemalis (Lange.) are closely cognate plants. Several other species with aromatic scent occur on the Mediterranean Sea.

Tilia Americana, Linné.

The Basswood Tree or North American Linden Tree, growing to 52° north latitude. Height of tree 80 feet, diameter of stem 4 feet. The wood is close-grained and firm, as soft as deal; used in the construction of musical instruments, particularly pianofortes. Specially valuable for the cutting-boards of curriers and shoemakers, bowls, pails, shovels, panelling of carriages (Robb). As the wood is free of knots, it is particularly eligible for turnery and carving, and certain portions of machinery. The tree is highly valued for street-planting in its native land. It also furnishes the linden bast. Tilia heterophylla (Vent.), the Silver Lime of North America, and Tilia Manchurica (Rupr.), of South Siberia, might be tested.

Tilia argentea, Desfontaines.*

The Silver Lime Tree of South-East Europe. The wood is not attacked by boring insects. The flowers are deliciously fragrant and yield on distillation a precious oil.

Tilia Europæa, Linné.

The common Lime of Europe, extending naturally to Japan, the large-leaved variety of South European origin. Height up to 120 feet, exceptionally 50 feet in girth. The wood pale, soft, and close-grained; sought for turnery, carving, and by shoemakers and glovers to cut the leather on it; also for toys (Simmonds). The flowers yield a highly aromatic honey (Meehan). The bast excellent for mats.

Tillandsia usneoides, Linné.

From Carolina and Florida to Uruguay and Chili, on trees. Might be naturalised in forests. In its native country a favourite material for upholsterers' work.

Tinguarra Sicula, Parlatore.

In the countries on the Mediterranean Sea. The root is edible and celery-like.

Todea Africana, Willdenow.

South Africa, South-East Australia, New Zealand. Most important for scenic effects in wet places; as an export article the aged stems of this fern are much sought and endured wide transits, which were initiated by the writer. Stems weighing above a ton have been found bearing from 500 to 600 fronds. Supplies of this massive fern in the gullies to be mantained for future generations by the dispersion of the dust-like spores.

Torreya Californica, Torrey. (*T. myristica,* Hooker.)

In California, extending from the coast to the Sierras. A symmetrical tree, 100 feet high, with a clear and straight trunk of 30 feet, 6 feet in diameter (Dr. Gibbons). The wood is hard and firm.

Torreya grandis, Fortune.

China. A tree 60 feet high, with an umbrella-shaped crown; it produces good timber.

Torreya nucifera, S. and Z. (*Caryotaxus nucifera,* Zuccarini.)

Japan. Height of tree about 30 feet. From the nuts the Japanese press an oil used as an article of food.

Torreya taxifolia, Arnott.

Florida. A tree 50 feet in height, with a firm, close-grained, durable wood of a reddish colour. Very durable also underground. Prostrated trees did not decay in half a century.

Dry timber very light, fine-grained, slightly more yellow than that of the White Pine (P. J. White). It yields a red turpentine (Hoopes).

Touchardia latifolia, Gaudichaud.

In the Hawaian Islands. A shrub allied to Boehmeria nivea, yielding a tough and easily separable fibre, as first shown by Dr. Hillebrand. Probably best adapted for humid warm gullies.

Tragopogon parvifolius, Linné.

The Salsify. Middle and Southern Europe, Middle Asia. Biennial. The root of this herb is well known as a useful culinary vegetable.

Trapa bicornis, Linné fil.*

The Leng or Ling or Links of China. The nuts of this water-plant are extensively brought to market in that country. The horns of the fruit are blunt. The kernel, like that of the two following species, is of an excellent taste. The plant is regularly cultivated in lakes and ponds of China.

Trapa bispinosa, Roxburgh.*

Middle and South Asia, where it is called "Singhara," extending to Ceylon and Japan; found also in Africa as far south as the Zambesi. The nuts are often worked into starch; they can be converted into most palatable cakes or porridge. They may be stored for food. The produce is copious and cheaply maintained by spontaneous redissemination. It lasts through several years. In some countries, for instance in Cashmere, the nuts form an important staple of food to the population. To this species probably belong T. Cochin Chinensis (Lour.) and T. incisa (Sieb. and Zucc.).

Trapa natans, Linné.*

The ordinary Waternut. Middle and South Europe, Middle Asia, North and Central Africa. Recorded as an annual. T. quadrispinosa (Roxb.), from Sylhet, is an allied plant.

Trichodesma Zeylanicum, Brown.

From Abyssinia and South Asia to extra-tropical Australia. An annual herb, perhaps available for green manure. The dromedaries show an extraordinary predilection for this herb (Giles). Several other species deserve trial for fodder.

Tricholæna rosea, Nees.

South Africa. This perennial grass promises to become valuable for desert country, together with T. Teneriffæ and other congeners.

Trifolium agrarium, Linné.

The perennial Yellow Clover or Hop Clover. All Europe, Western Asia. Of considerable value in sandy soil as a fodder herb. It is easily naturalised.

Trifolium Alexandrinum, Linné.*

The Bersin Clover. North-Eastern Africa, South-Western Asia, South Europe. Much grown for forage in Egypt, where it is used as the main fodder. On the Nile it gives three green crops during the season, each up to 2 feet high. Seeds of this and other clovers must be sifted to free them from the destructive Dodder plants or Cuscutas. About 20 lbs. of seeds are required for an acre (Morton). Recorded as annual.

Trifolium Alpestre, Linné.

Europe, West Asia. Perennial. Content with lighter soil than that needed for most Clovers, but its constituents must be fairly marly or limy. It is early out and very palatable (Langethal).

Trifolium fragiferum, Linné.

The Strawberry Clover. Europe, North Africa, Middle and North Asia. A perennial species, well adapted for clay-soils. Foliage closer and more tender than that of the White Clover, but its vegetation later (Langethal). Morton recommends it for moist sandy soil.

Trifolium hybridum, Linné.*

The Alsike Clover. Europe, North Africa, Western Asia. A valuable perennial pasture-herb, particularly for swampy localities. It succeeds where the ground becomes too sandy for Lucerne and too wet for Red Clover, but does not withstand drought so well, while it produces a heavier bulk of forage than White Clover, and maintains its ground when such has become too much exhausted for other Clovers. The seed being very small, less than half the quantity is required for the same area than of Red Clover.

Trifolium incarnatum, Linné.

The Carnation Clover; also called Crimson or Italian Clover.

Middle and South Europe. Though annual only, or sometimes biennial, it is valued in some of the systems of rotations of crops. In the south of England it is much sown on harrowed stubble fields to obtain an early fodder of great fattening value. It forms particularly a good fodder for sheep; it is recommended especially for gypsum regions. A white flowering variety exists. Bees are very fond of it (Darwin).

Trifolium medium, Linné.*

The Red Zigzag Clover. Europe, North and Middle Asia. A deep-rooting, wide-creeping, perennial herb, much better adapted for dry sandy places than T. pratense. It would also endure the inclemency of the clime of higher Alpine regions, if disseminated there. One of the best Clovers for forest regions. For regular culture it needs lime, like most plants of its class. More hardy than T. hybridum, less productive than T. pratense (Langethal). It ought not to be omitted among mixed clovers and grasses. According to Morton it is not so much sought and relished by grazing-animals as many other Clovers. T. Quartinianum (A. Rich) is an allied plant from Abyssinia, where several endemic species exist. Some of the twenty-five known Californian Clovers would deserve test culture.

Trifolium montanum, Linné.

Europe, West Asia. Perennial. Not without importance for limy or marly ground.

Trifolium ochroleucum, Linné.

Middle and South Europe, West Asia. Pale-yellow Clover. Perennial. This species is much cultivated in Upper Italy; its value is that of T. medium (Langethal).

Trifolium Pannonicum, Jacquin.

The Hungarian Clover. Perennial. Earlier in the season than Red Clover, to which it is allied, but less tender in foliage (Morton).

Trifolium pratense, Linné.*

The ordinary Red Clover. All Europe, North Africa, North and Middle Asia, extending to Japan. A biennial or under special circumstances also perennial herb, of great importance for stable fodder. It prefers rich soil, and particularly soil that is not devoid of lime; gypsum dressings are recommended for its fields. It enters very advantageously into the rotation system of crops. This species also would live in Alpine regions, where it would much enrich the pastures.

Nectar sucked by humble bees, which also tends to facilitate the production of seeds.

Trifolium reflexum, Linné.

North America. The Buffalo or Pennsylvanian Clover. Annual or biennial; flower-heads larger than those of the Red Clover; likes alluvial flats.

Trifolium repens, Linné.*

The ordinary White Clover. Europe, North Africa, North and Middle Asia, Sub-Arctic America. Perennial. Most valuable as a fodder plant on grazing-land. It has a predilection for moist soil, but springs again from dry spots after rain. It likes soil containing lime, prospers on poorer ground than Red Clover, is more nourishing and better digested and less exhaustive to the soil.

Trifolium resupinatum, Linné.

The annual Strawberry Clover. From South Europe and North Africa to Persia; also in the Canary Islands and Azores. Admitted here, though annual, as this clover is cultivated with predilection in Upper India; of tall growth and succulent foliage.

Trifolium spadiceum, Linné.

Brown Clover. Europe, West Asia. Though only annual or biennial, this has been recommended for wet sandy moorland, on which it redisseminates itself with readiness.

Trifolium subrotundum, Hochstetter.

The Mayad Clover. North and Middle Africa, ascending to 9,000 feet. A perennial species, in its native countries utilised with advantage for Clover culture. This by no means closes the list of the Clovers desirable for introduction, inasmuch as about 150 well-marked species are recognised, many doubtless of value for pasture. But the notes of rural observers on any of these kinds are so sparingly extant that much uncertainty about the yield and nutritive value of the various kinds continues to prevail. Most Clovers come from the temperate zone of Europe and Asia; only two are indigenous to the eastern of the United States of North America, none occurs in Australia, few are found in South Africa, several in California and the adjoining countries, several also in Chili; no species is peculiar to Japan.

Trigonella Fœnum Græcum, Linné.

Countries on the Mediterranean Sea. The seeds of this annual herb find their use in veterinary medicine.

Trigonella suavissima, Lindley.

Interior of Australia, from the Murray River and its tributaries to the vicinity of Shark's Bay. This perennial, fragrant, clover-like plant proved a good pasture herb. A lithogram, illustrating this plant, occurs in the work on the "Plants Indigenous to Victoria." Some of the many European, Asiatic, and African plants of this genus deserve our local tests.

Triphasia Aurantiola, Loureiro.

South-East Asia. This shrub is worth cultivation for the exquisite fragrance of its flowers. The fruits, though small, are of pleasant sweetness. The plant may prove also adapted for hedges. Glycosmis citrifolia (Lindley) and Claussena punctata (Oliver), also both East Asiatic fruit shrubs, may possibly show themselves hardy in sheltered forest regions of temperate clime.

Tripsacum dactyloides, Linné.

Central and North America; known vernacularly as Gama Grass. A reedy perennial grass, more ornamental than utilitarian. It is the original Buffalo Grass, and attains a height of 7 feet, assuming the aspect of maize. It is of inferior value for fodder, but serves for binding sand. The seeds are available for food.

Tristania conferta, R. Brown.

New South Wales and Queensland. A noble shady tree, attaining a height of 150 feet. It is not only eligible as an avenue tree, but also as producing select, lasting timber; ribs of vessels from this tree have lasted unimpaired thirty years and more.

Trithrinax Acanthocoma, Drude.

Rio Grande do Sul, in dry elevations. A dwarf Fan Palm for window or table decoration, attaining only a height of 6 feet; foliage not leathery.

Trithrinax Brasiliensis, Martius.

Rio Grande do Sul and Parana, Uruguay and Paraguay. A very hardy Palm, not tall.

Trithrinax campestris, Drude.*

Argentina, as far south as 32° 40'. Height 30 feet. One of the most southern of all Palms. Another species occurs in South Bolivia.

Triticum junceum, Linné.

Europe and North Africa. A rigid grass with pungent leaves and extensively creeping roots, requiring sea-sand for its permanent growth. One of the best grasses to keep rolling sand-ridges together, and particularly eligible where cattle and other domestic animals cannot readily be prevented from getting access.

Triticum vulgare, Villars.*

The Wheat. Apparently arisen through culture from Ægilops ovata (L.), and then a South European, North African, and Oriental plant. Traced back as an Egyptian and indeed also Chinese culture plant to nearly 5,000 years. In Japan wheat is of extraordinary precocity (Lartigne), and it is greatly recommended as a forage plant. This is not the place to enter into details about a plant universally known; it may therefore suffice merely to mention that three primary varieties must be distinguished between the very numerous sorts of cultivated Wheat: 1. *Var.* muticum, T. hybernum (L.), the Winter Wheat or Unbearded Wheat; 2. *Var.* aristatum, T. æstivum (L.), the Summer Wheat or Bearded Wheat; 3. *Var.* adhærens, T. Spelta (L.), Wheat with fragile axis and adherent grain. Metzger enumerates as distinct kinds of cultivated Wheat:—

T. vulgare (Vill.), which includes among other varieties the ordinary Spring Wheat, the Fox Wheat, and the Kentish Wheat. It comprises also the best Italian sorts for plaiting straw bonnets and straw hats, for which only the upper part of the stem is used, collected before the ripening of the grain, and bleached through exposure to the sun while kept moistened.

T. turgidum (L.), comprising some varieties of White and Red Wheat, also the Clock Wheat and the Revet Wheat.

T. durum (Desfont.), which contains some sorts of the Bearded Wheat.

T. Polonicum (L.), the Polish Wheat, some kind of which is well adapted for peeled Wheat.

T. Spelta (L.), the Spelt Corn or Dinkel Wheat, a kind not readily subject to disease, succeeding on soil of very limited fertility, not easily attacked by birds, furnishing a flour of

excellence for cakes, also yielding a superior grain for peeled Wheat. • For preparing the latter it is necessary to collect the spikes while yet somewhat green, and to dry them in baking-houses.

T. dicoccum (Schrank). (*T. amyleum,* Ser.) The Emmer Wheat. Its varieties are content with and prolific on poor soil, produce excellent starch, are mostly hardy in frost and not subject to diseases. To this belongs the Arras Wheat of Abyssinia, where a few other peculiar sorts of Wheat are to be found. A large-grained variety of Wheat is baked in Persia like rice (Colvill).

T. monococcum (L.). St. Peter's Corn, which is hardier than most other Wheats; exists in the poorest soils, but produces grains less adapted for flour than for peeled Wheat.

Tropæolum majus, Linné.

Peru. This showy perennial climber passes with impropriety under the name of Nasturtium. The herbage and flowers serve as cress, and are also considered antiscorbutic. A smaller species T. minus (L.), also from Peru, can likewise be chosen for a cress-salad; both besides furnish in their flower-buds and young fruits a substitute for capers. A volatile oil of burning taste can be distilled from the foliage of both, and this is more acrid even than the distilled oil of mustard seeds. In colder countries these plants are only of one year's duration. Numerous other species, all highly ornamental, occur in South America, and a few also in Mexico.

Tropæolum sessilifolium, Pœppig.

Chili. Among the species of this genus one of the most eligible for its tubers, which can be consumed even in a raw state, and are larger than those of most other Tropæolums, while the stems are short and procumbent (Philippi).

Tropæolum tuberosum, Ruiz and Pavon.

Peru. The tuberous root serves as an esculent.

Trophis Americana, Linné.

West Indian Archipelagus. The foliage of this milky tree has been recommended as food for the silk-insect. In Cuba and Jamaica it is used as provender for cattle and sheep.

Tuber æstivum, Vittadini.

The Truffle most in the markets of England. The White

British Truffle, Chairomyces meandriformis (Vitt.), though large, is valued less. In the Department Vaucluse (France) alone about 60,000 lbs. of Truffles are collected annually at a value of about £4,000. Many other kinds of Truffles are in use. The Australian Truffle, Mylitta Australis (Berk.), or Notiohydnum Australe, attains sometimes the size of the Cocos-nut, and is also a fair esculent. It seems also quite feasible to naturalise the best of edible fungi of other genera, although such may not be amenable to regular culture. And efforts should be made for the introduction of all the best kinds of Truffles, as an insight into the manner in which vegetables of the fungus species can be transferred to wide distances has gradually been obtained. The total value of the export of Truffles from France in 1877 amounted to 13,567,000 francs (Simmonds), the total production in that year being valued at 20 millions of francs. The annual revenue of the Truffle ground of Carpentras is, according to Simmonds, £80,000. The great White North American Truffle (Tuber album) is as white as snow and as tender as curds (Millington).

Tuber albidum, Fries.

Occurs with T. æstivum, but is smaller and less agreeable in taste. The means of transferring Truffles and any other edible fungi from one country to another require yet to be further studied and finally devised, but they appear quite feasible.

Tuber cibarium, Sibthorp.

Middle and South Europe. The Black Truffle. Like all others growing underground, and generally found in forest soil of limestone formations. It attains a weight over one pound. Experiments for naturalisation may be effected with every prospect of success by conveying the Truffle in its native soil and locating it in calcareous places of forest regions. As a condiment, or merely in a roasted state, it affords an aromatic food. The famous Quercy or Perigord Truffle is derived from this species. T. melanosporum (Vitt.), from France, Germany, and Italy, is of a still more exquisite taste than T. cibarium—indeed, of strawberry flavour.

Tuber magnatum, Pico.

Grey Truffle. South Europe. One of the most esteemed Truffles, with some garlic flavour. Hymenogaster Bulliardi (Vitt.) and Melanogaster variegatus (Tulasne) of South Europe are also excellent Truffles.

Tuber rufum, Pico.

Red Truffle, especially in vineyards. Much used for food, but smaller than the Terfezia Truffles.

Ulex Europæus, Linné.

Middle and South Europe, Azores, Canary Islands. The Whin, Gorse, or Furze. A bush important for covering quickly drift-sands on coasts. Too apt to stray as a hedge plant.

Ullucus tuberosus, Lozano. (*Melloca tuberosa,* Lindley.)

Andes of New Granada and Peru, up to an elevation of 9,000 feet. A perennial herb, the tubers of which are edible.

Ulmus alata, Michaux.

The Whahoo Elm of North America. Height of tree 30 feet. Wood fine-grained, heavier and stronger than that of the White Elm, of a dull-red colour, used by wheelwrights, but like that of U. Americana not equal to the European Elm.

Ulmus Americana, Linné.

The White Elm of North America, also called Rock or Swamp Elm. A tree of longevity, fond of moist river-banks. One hundred feet high, trunk 60 feet, 5 feet in diameter. Manning mentions that trees have been known to attain a circumference of 27 feet at 3 feet from the ground, and of 13 feet where the branches burst forth. It is highly prized for street-planting in North America. Can be propagated like the European Elm from suckers. Almost indifferent to soil. The timber is light, used for wheelwrights' work, bears driving of bolts well (Robb). It is durable if either kept quite dry or permanently submerged in water.

Ulmus campestris, Linné.*

The ordinary Elm, indigenous to South Europe and temperate Asia, as far east as Japan. Several marked varieties, such as the Cork Elm and Wych Elm, exist. The Elm in attaining an age of several centuries becomes finally of enormous size. In Britain much attacked by Scolytus destructor. The wood is tough, hard, fine-grained, and remarkably durable, if constantly under water. Next to the Yew, it is the best of European woods, where great elasticity is required, as for archery bows. It is also used for keels, blocks, wheels, piles, pumps, gun-carriages, gunwales, various tools, etc. Wych Elm is preferred for bending purposes (Eassie).* The bast is tough.

Ulmus crassifolia, Nuttall.

The evergreen Elm of Mexico and Texas.

Ulmus Floridana, Chapman.

The West Florida Elm. Forty feet high.

Ulmus fulva, Michaux.

The Slippery or Red Elm of North America. Sixty feet high. Splendid for street-planting (Vasey). There is a pendant branched variety. Wood red, tenacious. Useful for wagon hubs and wheels (Vasey). Regarded as the best North American wood for blocks of rigging, according to Simmonds. The leaves seem available for food of the silkmoth.

Ulmus Mexicana, Planchon.

Cordilleras of North America. This Elm attains a height of 60 feet or perhaps more. Many of these Elms are available as quick-growing avenue trees for shade-lines.

Ulmus parvifolia, Jacquin.

The evergreen Elm of China, Japan, and Queensland. A similar tree is found in the Himalaya Mountains.

Ulmus pedunculata, Fougeraux. (*U. ciliata,* Ehrhart.)

Europe and Asia, through their middle zone. A fine avenue-tree.

Ulmus racemosa, Thomas.

The Cork Elm of North America, also called Western Rock Elm. Wood as valuable as that of U. Americana, but much heavier. It is fine-grained and compact, tough, not liable to split, holds bolts better than most timber, extremely durable when constantly wet; deserves unqualified praise as a furniture wood for hardness, strength, beauty, and buff-reddish tint; largely employed for piles, pumps, naves, tackle blocks, keels, heavy agricultural implements, such as mowing and threshing machines, ploughs, gunwales (Robb, Sargent).

Ulmus Wallichiana, Planchon.

Himalayan Elm. In the mountains of India from 3,500 to 10,000 feet. A tree up to 90 feet high with deciduous foliage, the stem attaining a girth of 24 feet.

Uniola paniculata, Linné.

North-East America. This tall maritime grass can be chosen

on account of its creeping roots to bind rolling coast-sands. It serves also as a nourishing forage plant on sand-tracts.

Urena lobata, Linné.

Intratropic girdle around the globe. This herb has recently been enumerated among plants with comparatively tenacious fibre.

Urginia Scilla, Steinheil. (*Scilla maritima,* Linné.)

South Europe, North Africa. The medicinal Squill. The plant needs not regular cultivation, but settlers living near the coast might encourage its dissemination, and thus obtain the bulbs as drug from natural localities. Its peculiar bitter principle is called scillitin. The bulb contains 24 per cent. tannin. U. altissima (Baker) serves in South Africa as Squill.

Uvularia sessilifolia, Linné.

North America, in forests. This pretty herb is mentioned as yielding a good substitute for asparagus.

Vaccinium alatum, Dombey. (*Thibaudia alata,* Dunal.)

Frigid regions of the Andes of Peru. A tall evergreen shrub, with pink berries of the size of a cherry. This highly ornamental plant could be grown in Sub-Alpine regions.

Vaccinium Arctostaphylos, Linné.

On Mount Olympus. The leaves, dried and slightly heated, furnish the Broussa tea, the material for a very palatable beverage (G. Maw).

Vaccinium bicolor, F. v. Mueller. (*Thibaudia bicolor,* Ruiz and Pavon.)

Cold zones of the Peruvian Andes. A high evergreen bush, with red berries of the size of a hazel-nut. All Thibaudias seem best to form a section in the genus Vaccinium, some species of the latter—for instance, Vaccinium Imrayi (Hook.), from Dominica—mediating the transit. The species of the section Thibaudia are, as a rule, producing red berries of acidulous grateful taste. Many others may therefore deserve culture in forest ravines or on Alpine heights. They occur from Peru to Mexico, also in West India. One species, Vaccinium melliflorum (Thibaudia melliflora, R. and P.), has its flowers rich in honey-nectar.

Vaccinium caespitosum, Michaux.

Canada and Northern States of North America. A deciduous-leaved small bush, with bluish edible berries. V. ovalifolium (Smith) is an allied species.

Vaccinium corymbosum, Linné.*

The Swamp Blueberry or Blue Huckleberry. Canada and United States of North America. A good-sized shrub up to 15 feet high with deciduous foliage. Berries bluish black, rather large, aromatic, of sweetish taste, ripening late in the season.

Vaccinium erythrocarpum, Michaux. (*Oxycoccus erectus,* Pursh.)

Carolina and Virginia, on high mountains. An upright bush of a few feet in height, with deciduous leaves. The transparent scarlet berries, according to Pursh, are of excellent taste.

Vaccinium grandiflorum, Dombey. (*Ceratostemma grandiflorum,* Ruiz and Pavon.)

Andes of Peru. A tall evergreen shrub. The berries of a pleasant acidulous taste.

Vaccinium humifusum, Graham.

North-Western America, on the Rocky Mountains. Berries of this bush well flavoured.

Vaccinium Leschenaultii, Wight. (*Agapetes arborea,* Dunal.)

India, Neilgherries, and Ceylon. This evergreen species attains the size of a tree, flowering and fruiting throughout the year. The fruits resemble cranberries.

Vaccinium leucanthum, Cham.

Mountains of Mexico. An arborescent species. The blackish berries are edible.

Vaccinium macrocarpon, Aiton.* (*Oxycoccus macrocarpus,* Persoon.)

The large Cranberry. From Canada to Virginia and Carolina, particularly in sandy and peaty bogs, and in cold mossy swamps. A trailing evergreen bush, with stems attaining a length of 3 feet. It is this species which has become so extensively cultivated in the eastern parts of the United States, where on moory land, often not otherwise to be utilised, enormous quantities of this fruit have been produced by regular

culture at a highly profitable scale. The berries are of the acid taste, pleasant aroma, and scarlet brightness of the British Cranberry, but considerably larger.

Vaccinium meridionale, Swartz.

Jamaica, from the summits of the highest ranges down to the coffee regions. It attains a height of 30 feet and is evergreen. The small berries are of the taste and colour of those of V. Vitis Idæa.

Vaccinium Mortinia, Bentham.

Mountains of Columbia. A shrub several feet high. The fruits resemble those of V. Myrtillus, but are more acid. They come under the name Mortina to the Quito market.

Vaccinium myrtilloides, Michaux.

Michigan, Canada, Newfoundland, Labrador. The large edible berries are called Bluets. This little bush is adapted for higher Alpine country.

Vaccinium Myrtillus, Linné.*

The British Whortleberry or Bilberry. Throughout Europe, North and Middle Asia, remotest North America, in heathy and turfy forest land. A shrub, a few feet high or less, deciduous, erect, of great value for its copious supply of berries. They are, as well known, black with a bluish-grey hue, and of exceedingly grateful taste. The naturalisation of this plant on Alpine ranges and in cooler woodlands would prove a boon. The berries can be utilised for their dye. The whole bush contains quina acid.

Vaccinium ovalifolium, Smith.

North-West America from Mendocina to Oregon. This shrub bears large edible berries (Gibbons).

Vaccinium ovatum, Pursh.

Common throughout California, also in British Columbia, at an altitude of from 100 to 2,000 feet, attaining a height of about 8 feet. It bears its fruit in densely crowded racemes, the dark-blue berries being sometimes four lines in diameter and of good flavour. This species would doubtlessly form a valuable accession among cultivated fruits (Gibbons).

Vaccinium oxycoccus, Linné. (*Oxycoccus palustris,* Persoon.)

The British Cranberry. Throughout Europe, North and Middle

Asia, North America, on turf-moss in moory heaths. A creeping evergreen shrub of particular neatness. The berries give a most agreeable preserve and are of antiscorbutic value. This species is particularly eligible for the spongy, mossy bogs of snowy mountains.

Vaccinium parvifolium, Smith.

North-West America. A tall shrub. The berries are excellent for preserves.

Vaccinium penduliflorum, Gaudichaud.

Sandwich Islands, where it is called the "Ohelo." The acidulous berries of this bush are edible.

Vaccinium Pennsylvanicum, Lamarck.* (*V. angustifolium*, Aiton.)

The early Blueberry or Blue Huckleberry. North America, on dry woody hills. A dwarf bush with deciduous foliage, producing fruit in abundance. The berries are large, bluish black, and of sweet taste. V. Canadense (Kalm), according to Dr. Asa Gray, is closely allied.

Vaccinium præstans, Rudolphi.

Kamschatka. A minute plant, but with large delicious fruits. It might perhaps easily be disseminated on Alpine mountains.

Vaccinium uliginosum, Linné.

British Bog-Bilberry. Europe, North and Middle Asia, North America. A deciduous bush, with blackish berries, similar to those of V. Myrtillus, but hardly of equal excellence.

Vaccinium vacillans, Solander.

North America, in sandy forest lands. A deciduous small bush, coming with its blue berries later into season than V. Pennsylvanicum.

Vaccinium Vitis Idæa, Linné.

Europe, North and Middle Asia, North America. A dwarf shrub with evergreen leaves. The purplish-red berries are sought for jellies and other preserves.

It is as yet impossible to say how many other species of Vaccinium produce good-sized and well-flavoured fruits. The genus ranges in many species from Continental Asia to the Indian Archipelagus, and has a wide extension also in South America, occupying in hot countries higher mountain regions, but few

reliable notes on the tropical species are extant, as far as the fruits are concerned.

Vahea florida, F. v. Mueller. (*Landolphia florida*, Bentham.)

West Africa, up to 2,500 feet. This may prove hardy. Welwitsch describes the Aboh fruits of this species as sweet and acidulous, but was not less gratified with the beauty and marvellous abundance of its large snow-white and jasmin-scented flowers. V. florida yields also caoutchouc, and so V. Heudelotii (*Landolphia Heudelotii*, Cand.) from the Senegal regions. The excellent work on caoutchoucs of commerce, by James Collins, may be consulted as regards the sources of various kinds of Indian rubbers. The genus Vahea was fully established by Lamarck so early as 1791.

Vahea Owariensis, F. v. Mueller. (*Landolphia Owariensis*, Beauvois.)

Tropical West Africa, but ascending to the highlands of Angola, according to Dr. Welwitsch. This climber, with several other Vaheas, yields the West African and Madagascar caoutchouc. V. Owariensis produces edible fruits of the middle-sized orange, with sweet and slightly acid pulp.

Valeriana Celtica, Linné.

Alps of Europe. The root of this perennial herb is particularly aromatic.

Valeriana edulis, Nuttall.

North-Western America, from Oregon to the Rocky Mountains. The thick spindle-shaped root of this herb affords food to the natives of that part of the globe. When baked, the root proves agreeable and wholesome. When we consider the wild state of the plants from which many of our important root-crops arose, this Valeriana and several other plants, suggestively mentioned in these pages, may well be admitted for trial culture.

Valeriana officinalis, Linné.

Europe, North and Middle Asia, in swampy grass-land, with a predilection for forests and river banks. This perennial herb would do particularly well on higher mountains. It is the only one among numerous congeners of Europe, Asia, and America which is drawn to a considerable extent into medicinal use. The root and herb contain valerianic acid and a peculiar tannic acid; the root furnishes an essential oil, which again resolves

itself into valerol (70 per cent.), valereen, barneol, and valerianic acid. The order of Valerianeæ is not represented by any native plant in Australia.

Valerianella olitoria, Moench.

Lamb's Lettuce. Europe, North Africa, North and Middle Asia. A fair and early Salad-plant. It is an annual plant, and has several congeners in Europe and Asia.

Vangueria infausta, Burchell.

Africa, as far south as Natal and Caffraria. The fruit of this shrub or small tree is medlar-like, but superior in taste. Worth test cultivation with a view of improving the fruit.

Veratrum album, Linné.

Europe, North and Middle Asia, extending eastwards to Japan. It delights particularly in Sub-Alpine localities. The root furnishes veratrin, jervin, and sabadillic acid.

Veratrum viride, Aiton.

Canada and United States of North America. A near relative of the former plant. Its root has come recently into medicinal use.

Vicia Cracca, Linné.

Europe, North Africa, North and Middle Asia, North America. Perennial. Recommendable for naturalisation as a fodder plant in sylvan and Alpine lands. It yields in shade a three times larger return than in open places (Langethal). The cognate V. Cassubica and V. biennis (Linné) serve also for field culture.

Vicia Ervilia, Willdenow. (*Arvum Ervilia,* L.)

South Europe, North Africa, South-Western Asia. An annual herb, praised as a valuable fodder plant on dry calcareous soil.

Vicia Faba, Linné.*

The Straight Bean. Orient, particularly on the Caspian Sea. This productive annual herb affords not only its seeds for table use, but provides also a particularly fattening stable food. The seeds contain about 33 per cent. starch. V. Narbonensis (L.), from South Europe and South-West Asia, is preferable for the table, because its seeds contain less bitter principle, though they are smaller.

Vicia peregrina, Linné.

South Europe. Annual. In Italy preferred to the ordinary Tare for sandy soil; it recommends itself also for its close growth.

Vicia sativa, Linné.* (*V. angustifolia,* Roth.)

The ordinary Vetch or Tare. Europe, North Africa, North and Middle Asia. One of the best fodder plants, but only of one or two years' duration. Important also for green manure, and as a companion of clovers. The allied V. cordata (Wulfen) and V. globosa (Retzius) are similarly cultivated in Italy (Langethal). Many of the other European and Asiatic species of Vicia are deserving of our attention.

Vicia sepium, Linné.

Europe, West and North Asia. Deserves attention as a perennial Vetch, enduring an Alpine clime. It might with advantage be naturalised in forests and on mountains, but it can also readily be subjected to field culture, the yield being large and nutritious in regions with humid air, though the soil might be poor. This Vetch can be kept for about fifteen years continually on the same field (Langethal). V. Pannonica (Jacquin) is an allied but annual species.

Vicia Sitchensis, Bongard.

From California to Sitka. Asa Gray remarks that the young seeds of this tall Vetch are eatable like green peas.

Vicia sylvatica, Linné.

Europe, North Asia. The Wood Vetch. Perennial. Recommendable to culturists settling in new forest land; available also for Alpine copses. Pasture animals have a predilection for this Vetch; its yield is large. In limestone soil of forests V. pisiformis and V. Dumetorum (Linné) can best be selected for introduction.

Vicia tetrasperma, Koch. (*Ervum tetraspermum,* Linné.)

The Lentil Tare. Europe, West Asia, North Africa. Annual. According to Langethal this species is preferable to the ordinary Tare for sandy soil. It is also less hard as fodder and very palatable. Lime in the sand enlarges the yield. V. monantha and V. hirsuta (Koch) serve nearly as well.

Vigna lanceolata, Bentham.

Tropical and sub-tropical Australia. Mr. O'Shanesy observes that this twiner produces, along with the ordinary cylindrical pods, others underground from buried flowers, and these somewhat resemble the fruit of Arachis. The plant is available for culinary purposes.

Vigna Sinensis, Endlicher.* (*Dolichos Sinensis,* Linné.)

Tropical Asia and Africa. The cultivation of this twining annual pulse-herb extends to Southern Europe and many other countries with a temperate clime. The pods are remarkable for their great length, and used like French beans, dry as well as green. V. Catjang (A. Rich), V. sesquipedalis, and V. melanophthalma are varieties of this species. In fair soil the produce is forty-fold.

Villebrunia integrifolia, Gaudichaud.

India, ascending the Himalayan Mountains to 5,000 feet. A small tree, allied to the Rami plant, Boehmeria nivea. Mr. C. B. Clarke regards the fibre as one of the strongest available in India, it being used for bow-strings. Other Villebrunias—for instance, V. frutescens, and also some species of Debregeasia, particularly D. velutina—deserve likewise regular culture, for the sake of their fibre. Moist forest tracts seem particularly adapted for these plants, because V. integrifolia grows in Sikkim at an elevation where, according to Dr. G. King, the rainfall ranges from 100 to 200 inches. This fibre is much more easily separable than that of Maoutia Puya, according to Dr. King's observations.

Viola odorata, Linné.

The Violet. Middle and South Europe, North Africa, Middle Asia. Passingly alluded to here, as this modest, though lovely, plant should be extensively naturalised in forest glens, to furnish its delicate scent for various compositions of perfumery.

Vitis acetosa, F. v. Mueller.

Carpentaria and Arnhem's Land. Stems rather herbaceous than shrubby, erect. The whole plant is pervaded with acidity, and proved valuable in cases of scurvy. The berries are edible. This species, if planted in countries with a temperate clime, would likely spring annually afresh from the roots.

Vitis æstivalis, Michaux.*

The Summer Grape of the United States of North America.

Flowers fragrant. The berries are deep blue, of pleasant taste, and ripen late in the season.

Vitis Baudiniana, F. v. Mueller. (*Cissus Antarctica*, Ventenat.)
East Australia. With V. hypoglauca the most southern of all Grapes, none extending to New Zealand. It is evergreen, and a vigorous plant for bowers, but suffers even from slight frosts. The berries are freely produced and edible, though not large.

Vitis cordifolia, Michaux.* (*Vitis riparia*, Michaux.)
The Winter-Grape or Frost Grape. From Canada to Florida. A deciduous Vine. The scent of the flowers reminds of Reseda. The berries are small, either blackish or amber-coloured, and very acid. They can be used for preserves, and are only fully matured when touched by frosts. A succession of seedlings may give us a superior and simultaneously a very hardy Vine.

Vitis hypoglauca, F. v. Mueller.
East Australia, as far south as Gippsland. An evergreen climber of enormous length, forming a very stout stem in age. The black berries attain the size of small cherries. This species also may perhaps be vastly changed in its fruit by continued culture.

Vitis Indica, Linné.
On the mountains of various parts of India, ascending to an altitude of 3,000 feet in Ceylon. The small berries are edible. The plant should be subjected to horticultural experiments. This is an apt opportunity to draw attention to the various Indian species of Vitis with large edible berries—for instance, V. laevigata (Bl.), V. thyrsiflora (Miq.), V. mutabilis (Bl.), V. Blumeana (Steud.), all from the mountains of Java, and all producing berries as large as cherries, those of V. Blumeana being particularly sweet. Further may here be inserted V. imperialis (Miquel) from Borneo, V. auriculata (Wallich) and V. elongata (Wallich), both the last from the mountainous mainland of Coromandel, and all producing very large juicy berries, even in the jungle wilderness. V. quadrangularis (L.) stretches from Arabia to India and Central Africa, and has also edible fruits. Many such plants may be far more eligible for grape culture in hot wet climes than the ordinary Vine. About 250 species of Vitis are already known, mostly from intratropical latitudes, and mostly

evergreen; but in regard to their elevation above the ocean and to the nature of their fruits we are almost utterly without data.

Vitis Labrusca, Linné.*

The Isabella Grape. North America, from Canada to Texas and Florida, also in Japan. The Schuylkill Grape is derived from this species. A pale-fruited variety furnishes the Bland's Grape; another yields the American Alexander Grape. The berries are large among American kinds, and are of pleasant taste. Flowers fragrant. This and the other hardy North American Vines seem never to be attacked by the Oïdium disease.

Vitis Schimperiana, Hochstetter.

From Abyssinia to Guinea. This Vine may become perhaps valuable with many other Central African kinds for tropical culture, and may show itself hardy also in extra-tropical countries. Barter compares the edible berries to clusters of Frontignac grape.

Vitis vinifera, Linné.* The following notes were written for the original Victorian edition and are here only reproduced:—

The Grape Vine. Turkey, Persia, Tartary; probably also in the Himalayas and Greece. This is not the place to discuss at length the great industrial questions concerning this highly important plant, even had these not already engaged since many years the attention of a large number of our colonists. The whole territory of Victoria stretches essentially through the Vine zone, and thus most kinds of Vine can be produced here, either on the lowlands or the less elevated mountains in various climatic regions and in different geologic formations.

The Corinthian variety, producing the Currants of commerce, thrives also well in some districts, where with Raisins its fruit may become a staple article of our exports beyond home consumption. The Sultana variety is not much pruned; the bunches when gathered are dipped in an alkaline liquid obtained from wood-ashes, to which a little olive oil is added, to expedite drying, which is effected in about a week (G. Maw). The produce of Sultana raisins fluctuates from 7 to 30 cwt. per acre. The plant is best reared in the limestone formation. Dr. W. Hamm, of Vienna, has recently issued a Vine map of Europe, indicating the distribution of the different varieties and the principal sources of the various sorts of wine. The writer would now merely add that the preservation of the

grapes in a fresh state, according to M. Charmeux's method, and the sundry modes of effecting the transit of ripe grapes to long distances, ought to be turned to industrial advantage. The pigment of the dark wine-berries is known as racemic acid. The juice contains along with tartaric acid also grape acid. All these chemically defined substances have uses of their own in art and science. It might be worthy of a trial how far the Grape vine can be grafted on such other species of the extensive genus Vitis as may not be attacked by the destructive Pemphygus or Phylloxera. Irrespective of sulphur, latterly also borax has been recommended against the Oïdium disease. Professor Monnier of Geneva has introduced the very expansive sulphurous anhydrous acid gas against the Phylloxera. Dr. Herman Behr suggests for the mitigation of this plague the ignition of wood near vineyards, when the insect is on its wings, as all such insects seek fires and succumb in them largely when the sky is overcast or when the nights are without moonlight.

Vitis vulpina, Linné. (*Vitis rotundifolia*, Michaux.)

The Muscadine or Fox Grape. South-Eastern States of North America. Extends also to Japan, Manchuria, and the Himalayas. This species also includes as varieties the Bullace, the Mustang, the Bullate Grape, and both kinds of the Scuppernangs. The berries are of a pleasant taste, but in some instances of a strong flavour; they are the largest among American Grapes. The Clinton and Elsinboro Grapes, according to Mr. Meehan, the eminent American horticulturist, seem to have had their origin with V. cordifolia and V. riparia. V. Labrusca extends also to the Himalayas. Dr. Planchon's important memoir, "Les Vignes Américaines," published in 1875, should be consulted in reference to American Grapes.

Voandzeia subterranea, Thouars.

Madagascar and various parts of Africa, as far south as Natal. This Earth-Pea is annual, and pushes its pods under ground in the manner of Arachis hypogæa for maturation. The pods are edible and much consumed in tropical countries.

Wallichia caryotoides, Roxburgh.

India, up to 4,000 feet elevation (Kurz). A stemless palm, eligible for scenic group-planting.

Wallichia densiflora, Martius. (*W. oblongifolia*, Griffith.)

Himalaya, as far as 27° north. There one of the hardiest of

all Palms. It is not a tall one, yet a graceful and useful object for cultural industries. Several other species exist.

Wettinia augusta, Poeppig.

Peru, on mountains several thousand feet high. This Palm is therefore likely to endure a temperate clime.

Wettinia Maynensis, Spruce.

Cordilleras of Peru. Like the foregoing, it attains a height of 40 feet and advances to elevations of 3,000 or 4,000 feet. Before finally parting from the American Palms, it may be appropriate to allude briefly to some of the hardier kinds, which were left unnoticed in the course of this compilation. From Dr. Spruce's important essay on the Palms of the Amazon River may be learnt that, besides other species as yet imperfectly known from the sources of this great river, the following kinds are comparatively hardy; thus they might find places for cultivation or even naturalisation within the limits of extra-tropical countries: Geonema undata (Klotzsch), Iriartea deltoidea (R. and P.), Iriartea ventricosa (Mart.), which latter rises in its magnificence to fully 100 feet; Iriartea exorrhiza (Mart.); this, with the two other Iriarteas, ascends the Andes to 5,000 feet. Oenocarpus multicaulis (Spruce) ascends to 4,000 feet; from six to ten stems are developed from the same root, each from 15 to 30 feet high. Euterpe; of this two species occur in a zone between 3,000 and 6,000 feet. Phytelephas microcarpa (R. and P.), eastern slope of the Peru Andes, ascending to 3,000 feet. Phytelephus macrocarpa (R. and P.), also on the eastern side of the Andes, up to 4,000 feet; it is this superb species which yields by its seeds part of the vegetable ivory. Phytelephus æquatorialis (Spruce), on the west slope of the Peruvian Andes, up to 5,000 feet; this Palm is one of the grandest objects in the whole vegetable creation, its leaves attaining a length of 30 feet! The stem rises to 20 feet. Palm ivory is also largely secured from this plant. Though equinoctial, it lives only in the milder regions of the mountains. Carludovica palmata (R. and P.), on the east side of the Andes of Peru and Ecuador, up to 4,000 feet; the fan-shaped leaves from cultivated specimens furnish the main material for the best Panama hats. The illustrious Count de Castelnau saw many Palms on the borders of Paraguay during his great Brazilian expedition. Most of these, together with the Palms of Uruguay and the wide Argentine territory, would likely prove adapted for acclimation in temperate latitudes; but hitherto

the limited access to those countries has left us largely unacquainted with its vegetable treasures also in this direction. Von Martius demonstrated so early as 1850 the occurrence of the following Palms in extra-tropical South America: Ceroxylon australe (Mart.), on high mountains in Juan Fernandez, at 30° south latitude; Jubæa spectabilis (Humb.), in Chili, at 40° south latitude; Trithrinax Brasiliana (Mart.), at 31° south latitude; Copernicia cerifera (Mart.), at 29° south latitude; Acrocomia Totai (Mart.), at 28° south latitude; Cocos Australis (Mart.), at 34° south latitude; Cocos Yatai (Mart.), at 32° south latitude; Cocos Romanzoffiana (Cham.), at 28° south latitude; Diplothemium littorale (Mart.), at 30° south latitude. All the last-mentioned Palms occur in Brazil, the Acrocomia and Trithrinax extending to Paraguay, and Cocos Australis to Uruguay and the La Plata States.

While some Palms, as indicated, descend to cooler latitudes, others ascend to temperate and even cold mountain regions. Among the American species are prominent in this respect—Euterpe Andicola (Brogn.), E. Haenkeana (Brogn.), E. longivaginata (Mart.), Diplothemium Porallyi (Mart.), and Ceroxylon pithyrophyllum (Mart.), all occurring on the Bolivian Andes at an elevation of about 8,000 feet. Ceroxylon Andicola (Humb.), Kunthia montana (Humb.), Oreodoxa frigida (Humb.), and Geonoma densa (Linden) reach also on the Andes of New Granada a height of at least 8,000 feet. Ceroxylon Klopstockia (Mart.) advances on the Andes of Venezuela to a zone of 7,500 feet altitude, where Karsten saw stems 200 feet high, with leaves 24 feet long! There also occur Syagrus Sancona (Karst.) and Platenia Chiragua (Karst.) at elevations of 5000 feet, both very lofty Palms. From the temperate mountain regions of sub-tropical Mexico are known, among others, Chamaedora concolor (Mart.), Copernicia Pumos (Humb.), C. nana (Kunth), and Brahea dulcis (Mart.), at elevations from 7,000 to 8,000 feet.

Widdringtonia juniperoides, Endlicher.

South Africa, 3,000 to 4,000 feet above sea-level. A middling-sized tree, rich in resin.

Wistaria Chinensis, Candolle.

The "Fuji" of Japan. Lives through a century and more. The stem is carried up straight, and the branches are trained on horizontal trellises at Japanese dwellings, affording shades for seats beneath. One Wistaria tree will thus cover a square of 50 feet by 50 feet, the odorous trusses of flowers pendant through the trellis overhead (Christy). Fortune tells us of a

tree of great age which measured at 3 feet from the ground 7 feet in circumference, and covered a space of trellis-work 60 feet by 102 feet. Flowers likely available for scent distillation.

Witheringia solanacea, L'Heritier.

South America. This perennial herb needs trial culture, on account of its large edible tubers.

Xanthorrhiza apiifolia, L'Heritier.

North America. A perennial, almost shrubby plant of medicinal value. The root produces a yellow pigment similar to that of Hydrastis Canadensis (L.). Both also contain berberin.

Ximenia Americana, Linné.

Tropical Asia, Africa, and America, passing, however, the tropics in Queensland, and gaining also an indigenous position in Florida. This bush may therefore accommodate itself to cooler clime in localities free of frost. The fruits are edible, resembling yellow plums in appearance; their taste is agreeable. The wood is scented.

Yucca brevifolia, Engelmann.

Arizona and Utah, in the deserts. Attains a height of 20 feet. The whole plant can be converted into paper (Vasey).

Yucca filamentosa, Linné.

The Adam's Needle. From Carolina and Florida to Texas and Mexico. An almost stemless species. It would hardly be right to omit here the plants of this genus altogether, as they furnish a fibre of great strength, similar to that of the Agaves. Moreover, all these plants are decorative, and live in the poorest soil, even in drifting coast-sand. They are also not hurt, as is the case with the Fourcroyas, by slight frosts. Among the species, with stems of several feet in height, may be recorded Y. gloriosa (L.) and Y. aloifolia (L.), both from the sandy south coast of North America. The former proved hardy at Torquay, England (W. Wood).

Yucca Treculiana, Carrière.

From Texas westward. Height of stem up to 50 feet, branched only near the summit. Grand in aspect and also most showy on account of its vast number of white flowers of porcelain lustre. The fruit tastes like that of the Papaw (Lindheimer).

Zalacca secunda, Griffith.

Assam, as far north as 28°. A stemless Palm with large feathery leaves, exquisitely adapted for decorative purposes. Before we finally quit the Asiatic Palms we may yet learn from Von Martius's great work how many extra-tropical members of this princely Order were already known in 1850, when that masterly work was concluded. Martius enumerates as belonging to the boreal extra-tropical zone in Asia: *From Silhet at 24° north latitude:* Calamus erectus, Roxb.; C. extensus, Roxb.; C. quinquenervius, Roxb.;—*from Garo at 26° north latitude:* Wallichia caryotoides, Roxb.; Ptychosperma gracilis, Miq.; Caryota urens, L.; Calamus leptospadix, Griff.;—*from Khasya, in 26° North latitude:* Calamus acanthospathus, Griff.; C. macrospathus, Griff.; Plectocomia Khasyana, Griff.;—*from Assam, about 27° north latitude:* Areca Nagensis, Griff.; A. triandra, Roxb.; Livistona Jenkinsii, Griff.; Daemonorops nutantiflorus, Griff.; D. Jenkinsii, Griff.; D. Guruba, Mart.; Plectocomia Assamica, Griff.; Calamus tenuis, Roxb.; C. Flagellum, Griff.; C. Heliotropium, Hamilt.; C. floribundus, Griff.; Phœnix Ouseloyana, Griff.;—*from Upper Assam, between 28° and 29° north latitude:* Caryota obtusa, Griff.; Zalacca secunda, Griff.; Calamus Mishmelensis, Griff.;—*from Darjiling, at 27° north latitude:* Wallichia obtusifolia, Griff.; Licuala peltata, Roxb.; Plectocomia Himalaiana, Griff.; Calamus schizospathus, Griff.;—*from Nepal, between 28° and 29° north latitude:* Chamaerops Martiana, Wall.;—*from Guhrval, in 30° north latitude:* Calamus Royleanus, Griff.;—*from Saharanpoor, in 30° north latitude:* Borassus flabelliformis, L.;—*from Duab, in 31° north latitude:* Phœnix sylvestris, Roxb.;—*from Kheree, in 30° north latitude:* Phœnix humilis, Royle;—*from Dekan:* Bentinckia Coddapanna, Berry, at an elevation of 4,000 feet.

Miquel mentions as Palms of Japan (entirely extra-tropical): Rhapis flabelliformis, Aiton; R. humilis, Blume; Chamærops excelsa, Thunb.; Livistona Chinensis, Br.; and Arenga saccharifera, Labill., or a species closely allied to that Palm.

Zea Mays, Linné.*

The Maize or Indian Corn. Indigenous to the warmer parts of South America. St. Hilaire mentions as its native country Paraguay. Found in Central America already by Columbus. This conspicuous, though annual, cereal grass interests us on this occasion as being applicable to far more uses than those for which it has hitherto been employed. In North America,

for instance, Maize is converted into a variety of dishes for the daily table, being thus boiled in an immature state as "green corn." Mixed with other flour it furnishes good bread. For some kinds of cakes it is solely used, also for maizena, macaroni, and polenta. Several varieties exist, the Inca Maize of Peru being remarkable for its gigantic size and large grains. Maize is not readily subject to the ordinary corn diseases, but to prosper it requires fair access to potash and lime. Good writing and printing papers can be prepared from maize straw. Meyen calculated that the return from maize under most favourable circumstances in tropical countries would be eight hundred fold, and under almost any circumstance it is the largest yielder among cereals in warm countries. Mr. Buchanan of Lindenau obtained 150 bushels from an acre in Gippsland flats, colony Victoria. As a fattening saccharine green-fodder, maize is justly appreciated. Any ergot from it is used, like that of rye, for medicinal purposes. Maize corn contains about 75 per cent. of starch. Dierbach recommends mellago or treacle from maize instead of that prepared from the roots of Triticum repens (L.), and the molasses so obtained serve also culinary uses. Exposure to extreme and protracted cold—four years in Polaris Bay, Smith Sound, 81′ 38° north latitude—did not destroy the vitality of wheat and maize grains (R. J. Lynch).

Zelkova acuminata, Planchon. (*Planera acuminata,* Lindley; *P. Japonica,* Miquel.)

The "Keaki," considered one of the best timber trees of Japan; proved of rapid growth and valuable as a shade tree at Melbourne. The wood never cracks, and is thus most extensively used for turnery, also much for furniture (Rein.). Stems occasionally 20 feet in girth. For out-door work the most valued wood in Japan (Christie).

Zelkova crenata, Spach. (*Planera Richardi,* Michaux.)

South-West Asia, ascending to 5,000 feet. In favourable localities a good-sized tree, with qualities resembling those of the Elms. The allied Z. cretica (Spach) is restricted to South Europe.

Zingiber officinale, Roscoe.

The Ginger. India and China. Possibly this plant may be productive also in the warmer temperate zone, and give satisfactory results. The multiplication is effected by division of the root. For candied ginger only the young succulent roots

are used, which are peeled and scalded prior to the immersion into the saccharine liquid.

Zizania aquatica, Linné.* (*Hydropyrum esculentum,* Link.)

The Canada Rice. In shallow streams and around ponds and lakes from Canada to Florida. This tall grass might be readily naturalised. Although its grain can be utilised for bread-corn, we would wish to possess the plant, chiefly to obtain additional food of a superior kind for water-birds.

Zizania latifolia, Hance.* (*Hydropyrum latifolium,* Grisebach.)

The Kau-sun of China. In lakes of Amur, Manchuria, China, and Japan. Nearly related to the preceding species. From Dr. Hance we know that the solid base of the stem forms a very choice vegetable, largely used in China, where this tall water-grass undergoes regular cultivation like the Trapa.

Zizania miliacea, Michaux.

Southern part of North America, West India. Likewise tall and perennial, but more restricted to the tide-water meadows and ditches, according to Pursh; but according to Chapman's note, generally distributed like Z. aquatica, with which it has similar use. In South Brazil occurs a similar grass—namely, Z. microstachya (Nees).

Zizyphus Joazeiro, Martius.

Brazil. Recommended as yielding fruit in arid regions.

Zizyphus Jujuba, La Marck.

From India to China, East Australia, extending also to tropical Africa, ascending the Himalayas to 4,500 feet. This shrub or tree can only be expected to bear its pleasant fruits in the warmer part of the temperate zone. The fruit is red or yellow, and of the size of a cherry. The Tussa silkworm, which, according to Dr. Forbes Watson, is the most important and widely distributed of the wild silk-insects of India, feeds on Z. Jujuba, but also on Terminalias, Shorea, Bombax heptaphyllum, and some other trees. Often the cocoons are merely collected in the forests.

Zizyphus Lotus, La Marck.

Countries around the Mediterranean Sea. The fruits are small and less sweet than those of Z. vulgaris; nevertheless they are largely used for food in the native country of this bush. Z. nummularia (Wight and Arnott) is an allied

species from the mountains of India, ascending to 3,000 feet. It is much used for garden hedges. The fruit is sweet and acidulous and of a pleasant flavour (Brandis).

Zizyphus Mistal, Grisebach.

Argentina. A fine tree with edible fruits.

Zizyphus rugosa, La Marck.

Nepal and other mountainous parts of India. A small tree, hardier than the last. The drupe of this is also edible, and the same may be said of a few other Indian species.

Zizyphus Sinensis, La Marck.

China and Japan. Similar in use to the last.

Zizyphus Spina Christi, Willdenow.

Middle and North Africa, South-West Asia. Rather a hedge plant than a fruit bush.

Zizyphus vulgaris, La Marck.

Orient, particularly Syria, in the Himalayas up to 6,500 feet. A small tree, well adapted for a temperate clime. Fruits scarlet, about an inch long, with edible pulp; they are known as South European Jujubes. The allied Z. oxyphylla (Edgeworth) has a very acid fruit.

Zoysia pungens, Willdenow.

Eastern and Southern Asia, East Australia. This creeping grass, although not large, is important for binding coast-sands; it will live on saline soil.

ADDITIONS.

Acacia aneura, F. V. Mueller.

Arid desert, interior of extra-tropical Australia. A small tree up to 25 feet high. Wood excessively hard, dark brown, used preferentially by the natives for boomerangs, sticks to lift edible roots, shafts of Phrogmites-spears, woomerangs,

nulla-nullas, the jagged spear-ends. A. excelsa (Benth.) and A. fasciculifera (F. v. M.) are among the Queensland species, which furnish most valuable dark wood.

Acacia stenocarpa, Hochstetter.

Abyssinia and Nubia. A large tree. Yields the brownish Luakin or Talha gum, a kind of gum-arabic (Hanbury and Flueckiger).

Acanthophœnix rubra, H. Wendland.

Mauritius and Bourbon. This Palm proved hardy as far south as Sydney (C. Moore). Height up to 60 feet. The upper rings of the stem bright red.

Albizzia basaltica, Bentham.

Eastern sub-tropical Australia. A small tree; the wood praised by Mr. O'Shanesy for its reddish colour and silky lustre. Cattle like the foliage.

Arundinaria Hookeriana, Munro.

Himalayas, up to nearly 7,000 feet. A dwarf species, only 15 feet high, vernacularly known as Yoksun and Praong. The seeds are edible and are used also for beer (Sir J. Hooker).

Bambusa Balcooa, Roxburgh.*

From the plains of Bengal up to Assam. Proved hardy at the Cape of Good Hope. Height up to 70 feet. With P. Tulda the principal bamboo for constructing large huts or sheds, but Roxburgh found that to render the material durable it needs long immersion in water.

Bambusa Tulda, Roxburgh.

Southern India, chiefly on the plains. Grows in a month up to 70 feet, according to Roxburgh. With B. Balcooa it furnishes the principal material for the bamboo houses in Bengal (C. B. Clarke).

Bassia latifolia, Roxburgh.

Central India, up to 2,000 feet. The "Mahwa." A tree 50 feet high. Content with dry stony ground. Will endure a slight frost. The succulent corollas afford a never-failing crop of food to the native inhabitants. Each tree yields from two to three cwt. of corollas, which supply a nourishing esculent. One hundredweight yields three gallons of spirit; essential oil

is also obtained from the corolla. The seeds yield a fixed oil for particular soap. The flowers, for cattle feeding, keep well for a long time.

Calyptronoma Swartzii, Grisebach.

West India. A Palm, up to 60 feet high. Advances on tropical mountains to over 3,000 feet elevation. This Palm yields the "long thatch" of Jamaica; the foliage furnishing an amber-coloured roofing material more neat and durable than any other used in that island, lasting longer than shingles—twenty years or more without requiring repairs (Juman).

Cornus florida, Linné.

North America. The "Dogwood." A showy tree, up to 30 feet high. Wood much in demand for shuttles, handles, harrow-teeth, horse-collars, sledge-runners.

Dypsis pinnatifrons, Martius.

Madagascar. This dwarf Palm proved hardy in Sydney with Copernicia cerifera.

Eucalyptus Baileyana, F. v. M.

South Queensland. A handsome tree, content with sandy soil. One of the best trees for timber in the Moreton Bay districts. Trunk 1½ to 2 feet in diameter, 50 feet to first branches (Bailey).

Eucalyptus corynocalyx, F. v. M.

South Australia. Sugar Gum-tree. A timber tree, up to 120 feet high, with a stem attaining a circumference of 17 feet towards the base. The wood, according to T. E. Brown, Conservator of Forests of South Australia, possesses excellent qualities. In culture observed by me to be not of very quick growth. The sweetish foliage attracts cattle and sheep, who browse on the lower branches, saplings, and seedlings,—unlike what occurs with almost any other kind of Eucalypt except E. Gunnii (J. Hooker). The base of the trunk swells out in regular tiers (T. E. Brown).

Eucalyptus Sieberiana, F. v. Mueller. (*E. virgata*, Sieber.)

New South Wales, Victoria, Tasmania. A tall timber tree in Gippsland, up to 4,000 feet elevation. This species is only on the highest mountains stunted to virgate growth. Wood of superior quality, light, tough, and elastic, used for swingle-trees of buggies, ploughs, valuable for splitting and sawing, but it will not stand underground (Howitt).

Glyptostrobus heterophyllus, Endlicher.

China. An ornamental tree, allied to Taxodium distichum in some respects, and like that tree particularly fit for permanently wet ground. The Chinese plant it along the edges of canals and narrow creeks, the buttress of the trunk standing actually in the moist mud (Hance).

Lepironia mucronata, Cl. Richard.

East Australia, Malayan Archipelagus, East India, South China, and Madagascar. This rush is cultivated like rice in China, but in poor soil, because manuring the ground would impair the strength of the mats. The plant renews itself by sprouts from its perennial root. It attains a height of 7 feet; the stems are beaten flat, to fit them to be woven or plaited for either bed-mats, bags, and more especially mat-sails, the latter being most extensively used for the junks and crafts in China; further for floor-matting, which is in vast quantities also exported to the United States, to be used in summer for the sake of coolness in preference to carpets (Hance). This rush thus furnishes the raw material for a vast manufacturing industry. Dyeing the mats yellow is effected with the flowers of Sophora Japonica under the addition of alum; for green, with an acanthaceous plant, the "Lam-yip" (Blue Leaf), and alum and sulphate of copper (Dr. Hirst).

Michelia excelsa, Blume.

In the Himalayas up to 7,000 feet. One of the best of timber trees there. M. lanuginosa (Wallich) ascends there also to temperate regions with M. Kisopa (Hamilton), M. Cathcartii (Hooker and Thomson), M. Champaca (Linné), M. Punduana (H. and T.), and M. Nilagirica (Zenker), all being tall trees.

Murraya exotica, Koenig.

South Asia, Polynesia, East and North Australia. This shrub or small tree is superior to most odoriferous plants in India (C. B. Clarke).

Oreodoxa oleracea, Martius.

West India, up to nearly 5,000 feet elevation (Jenman). One of the most rapid growing of any palms. In highly manured moist ground the palm cabbage, which in this species is of exquisite nut-flavour, can be obtained in two years (Jenman).

TABLE OF AVERAGE ANNUAL RAINFALL AND TEMPERATURE AT STATIONS IN INDIA.

[Compiled in the Office of the Meteorological Reporter to the Government of India.]

Station.	Average Yearly Rainfall.		Yearly Mean Temperature.		Extreme Maximum Temperature.		Extreme Minimum Temperature.	
	Years.	Inches.	Years.	Degrees Fahr.	Years.	Degrees Fahr.	Years.	Degrees Fahr.
Goalpara . .	17	93·34	9—10	75·0	10	99·7	10	42·0
Sibsagar . .	22—24	93·98	5	73·0	5	99·5	5	39·1
Shillong . .	12—13	86·93	3—4	62·2	3—4	84·0	3—4	32·5
Silchar . .	21—22	117·54	9—10	75·5	9	99·0	9	42·0
Chittagong . .	20—24	103·73	11	77·7	8	99·0	9	45·4
Calcutta . .	49—50	65·80	26	79·3	20—23	106·0	20—23	51·4
Hazaribagh . .	17—19	48·52	10—11	74·4	14	110·0	14	37·5
Sambalpur . .	14—16	54·18	7—8	79·2	5	114·5	5	36·5
Cuttack . .	18—20	55·60	11	80·7	8—10	118·0	8—10	48·8
Akyab . .	21—22	196·63	9—11	78·9	9—10	100·5	9—10	47·3
Rangoon . .	9	99·69	2—3	79·6	3	106·7	3	57·4
Moulmain . .	29	189·39	2—3	79·6	3	101·5	3	56·2
Port Blair . .	11	117·39	10—11	80·6	11	99·0	11	67·0
Chikalda . .	7—8	58·13	2—3	71·1	2	103·0	2	44·7
Pachmarhi . .	7—8	80·93	6—7	69·0	6—8	107·0	6—8	30·0
Seoni . .	20—22	49·02	7	74·4	8	112·0	8	37·4
Jubbulpore . .	33—35	52·32	10	75·3	8	114·5	8	32·3
Saugor . .	20—23	47·23	8—9	75·8	7	114·0	7	40·3
Ajmere . .	14—15	23·34	11—12	77·3	9—10	118·0	12—13	30·1
Sirsa . .	27—28	15·17	2—3	75·7	2—3	116.8	2—3	29·9
Mooltan . .	21	7·52	8—10	76·0	9—12	127·8	8—12	26·0
Murree . .	4	58·44	8—9	55·8	9	103·0	9	18·0
Rawalpindi . .	20—21	33·89	11—12	69·2	12—13	124·6	12—13	20·0
Lahore . .	20—21	21·48	10—12	75·1	12—13	127·0	12—13	27·0
Simla . .	16—17	70·20	5—7	54·5	6—7	90·0	5—6	20·0
Chakrata . .	10	59·96	8—9	56·1	10	91·0	10	18·7
Delhi . .	28—29	27·20	3—4	77·2	4—5	121·2	3—5	31·8
Roorkee . .	18—19	40·92	12	74·6	10—11	116·6	10—11	29·7
Lucknow . .	8—11	41·69	11	78·0	11	119·0	11	30·0
Allahabad . .	21—22	35·92	9—10	77·6	9	119·8	9	36·0
Patna . .	23—25	40·09	10—11	77·7	11	116·3	11	36·4
Khatmandu . .	24—28	55·90	...	...	...	...	...	...
Darjeeling . .	18—21	118·24	11	54·0	10	84·2	10	26·0
Mongpoo, Cinchona garden . .	5—6	119·44	1	65·3	1	83·6	1	41·9
Newera Eliya .	8—9	99·45	8—9	59·1	4	79·0	4	23·0
Kandy . .	9	81·27	8—9	76·4	4	88·2	4	61·4
Wellington . .	2—4	40·82	2—4	61·2	2	83·4	2	37·5
Trichinopoly .	25—27	38·70	4	82·9	3—4	107·9	3—4	59·6
Bangalore . .	41—42	35·38	3	73·6	3—4	98·3	3—4	48·9

TABLE OF AVERAGE ANNUAL RAINFALL AND TEMPERATURE (concluded).

STATION.	Average Yearly rainfall.		Yearly Mean Temperature.		Extreme Maximum Temperature.		Extreme Minimum Temperature.	
	Years.	Inches.	Years.	Degrees Fahr.	Years.	Degrees Fahr.	Years.	Degrees Fahr.
Madras . .	66	48·51	11	82·4	4	109·6	4	61·4
Bellary . .	25	17·33	4	81·1	4	108·5	4	53·0
Poona . .	23	30·41	4	77·6	4	101·2	4	56·1
Bombay . .	32—62	74·20	28	78·9	4	94·9	4	58·0
Kurrachee . .	22—23	7·61	4	77·6	4	110·4	4	41·5
Jacobabad . .	18	4·86	1—2	77·5	1—2	119·5	1—2	31·6
Deesa . .	21—23	23·75	4	79·7	4	111·2	4	39·2
Mount Abu . .	19	62·36	2—3	68·1	2—3	97·2	2—3	32·8
Malegaon . .	9—18	23·52	1—2	78·6	1—2	108·3	1—2	39·3
Nagpur . .	31—32	43·43	9—10	78·8	10	117·1	10	43·2
Akola . .	17—18	27·05	5—6	78·7	3—4	113·7	3—4	36·7

INDICATED GENERA.

Alimentary Plants—

1. Yielding Herbage (for human nutrition)—

   Agriophyllum, Allium, Amarantus, Anthriscus, Apium, Aralia, Atriplex, Barbaræa, Basella, Beta, Bongardia, Borrago, Brassica, Chenopodium, Corchorus, Crambe, Cynara, Euchlæna, Fagopyrum, Gunnera, Hibiscus, Lactuca, Lepidium, Musa, Pharnaceum, Pringlea, Pugionium, Rheum, Rumex, Sanguisorba, Scandix, Scorzonera, Spinacia, Talinum, Tetragonia, Theligonum, Tropæolum, Valerianella, Zizania.

2. Yielding Roots—

   Allium, Apios, Aponogeton, Arracacha, Asparagus, Beta, Boussingaultia, Brassica, Butomus, Carum, Chærophyllum, Cichorium, Cochlearia, Colocasia, Conopodium, Cordyline, Crambe, Cymopterus, Cyperus, Daucus, Dendrocalamus, Dioscorea, Diposis, Eustrephus, Ferula, Flemingia, Fluggea, Geitonoplesium, Gigantochloa, Gladiolus, Heleocharis, Helianthus, Hypochœris, Ipomœa, Iris, Manihot, Microseris, Nelumbo, Oxalis, Pachyrrhizus, Peucedanum, Pimpinella, Pouzolzia, Priva, Psoralia, Pueraria, Raphanus, Rhaponticum, Ruscus, Scilla, Scorzonera, Sechiu, Selinumm, Solanum, Stilbocarpa, Thapsia, Tinguarra, Tragopogon, Tropæolum, Ullucus, Uvularia, Valeriana, Witheringia.

3. Yielding Cereal Grain—

   Andropogon, Avena, Eleusine, Hordeum, Oryza, Panicum, Pennisetum, Poa, Secale, Triticum, Zea, Zizania.

4. Yielding Table Pulse—

   Cajanus, Caragana, Cicer, Cyamposis, Dolichos, Ervum, Lupinus, Mucuna, Phaseolus, Pisum, Vicia, Vigna.

5. Yielding various Esculent Fruits—

   Aberia, Acanthosicyos, Achras, Adenostemon, Albizzia, Alibortia, Amarantus, Amelanchier, Anona, Arachis, Araucaria, Aristotelia, Artocarpus, Atalantia, Averrhoa, Benincasa, Berberis, Borassus, Canavalia, Carissa, Carya, Casimiroa, Castanea, Castanopsis, Celtis, Ceratonia, Cereus, Cervantesia, Citrus, Coccoloba, Condalia, Corynocarpus, Corynosicyos,

Cratægus, Cucumis, Cucurbita, Cudrania, Cynara, Debregeasia, Diospyros, Euclea, Eugenia, Fagopyrum, Ficus, Fragaria, Gaultiera, Gaylussacia, Gingko, Gourliaca, Guevina, Hibiscus, Hovenia, Hymenæa, Juglans, Juniperus, Lapageria, Limonia, Macadamia, Maclura, Mangifera, Marlea, Marliera, Melicocca, Mesembrianthemum, Moringa, Morus, Musa, Myrica, Myrtus, Nageia, Nelumbo, Nephelium, Niemeyera, Nuphar, Nyssa, Opuntia, Pappea, Parinarium, Passiflora, Peireskia, Persea, Peumus, Phœnix, Photinia, Physalis, Pinus, Pistacia, Prunus, Psidium, Punica, Pyrularia, Pyrus, Quercus, Ribes, Rubus, Salpichroma, Sambucus, Santalum, Sechium, Shepherdia, Solanum, Spondias, Sterculia, Tamarindus, Telfairia, Terminalia, Trapa, Triphasia, Vaccinium, Vahea, Vangueria, Vitis, Voandzeia, Ximenia, Zizyphus.

6. Truffles and Mushrooms—

Agaricus, Boletus, Cantharellus, Clavaria, Helvella, Hydnum, Hymenangium, Lycoperdon, Morchella, Pachyma, Peziza, Polygaster, Polyporus, Rhizopogon, Terfezia, Tuber.

Avenue Plants (for street-planting)—

Acer, Æsculus, Castanea, Corylus, Cupressus, Eucalyptus, Ficus, Fraxinus, Grevillia, Jubaca, Juglans, Melia, Oreodoxa, Pinus, Pircunia, Pistacia, Planera, Platanus, Populus, Prunus, Pyrus, Quercus, Robinia, Salix, Sequoia, Thespesia, Tilia, Ulmus, Zelkova.

Bamboo Plants—

Arundinaria (Arundo), Bambusa, Beesha, Dendrocalamus, Gigantochloa, Guadua, Melocanna, Oxytenanthera, Phyllostachys, Schizostachyum (many other genera mentioned under Schizostachyum), Teinostachyum.

Camphor Plant—

Cinnamomum.

Coffee Plant—

Coffea (doubtful).

Condiment Plants—

Acorus, Allium, Apium, Archangelica, Artemisia, Asperula, Borrago, Brassica, Calamintha, Calyptranthes, Capparis, Capsicum, Carum, Chærophyllum, Cinnamomum, Citrus, Cochlearia, Coriandrum, Crithmum, Cuminum, Fœniculum,

Glycine, Illicium, Laserpitum, Laurus, Lepidium, Lindera, Mentha, Meriandra, Monarda, Monadora, Myrrhis, Nyssa, Ocimum, Olea, Origanum, Peucedanum, Pimpinella, Prunus (Amygdalus), Pycnanthemum, Satureja, Sison, Smyrnium, Spilanthes, Tropæolum, Thymus, Tuber, Valerianella, Zingiber.

Cork Plant—

Quercus.

Dye Plant—

Acacia, Acer, Albizzia, Aleurites, Alkanna, Alnus, Anthemis, Baloghia, Cæsalpinia, Carthamus, Carya, Chlorogalum, Cladastris, Coccoloba, Crocus, Crozophora, Cytisus, Dracæna, Excæcaria, Fagopyrum, Fraxinus, Garcinia, Gunnera, Helianthus, Heterothalamus, Indigofera, Isatis, Juglans, Lawsonia, Lithospermum, Lyperia, Maclura, Mallotus, Onosma, Opuntia, Peireskia, Peltophorum, Perilla, Peumus, Phyllocladus, Pinus, Polygonum, Quercus, Reseda, Rhamnus, Rhus, Roccella, Rubia, Sambucus, Saponaria, Solanum, Sophora, Spartium, Terminalia, Theymelæa, Vaccinium, Xanthorrhiza.

Fibre Plants—

Agave, Apocynum, Boehmeria, Broussonetia, Camelina, Cannabis, Caryota, Chlorogalum, Copernicia, Corchorus, Cordyline, Coratalaria, Cyperus, Debregeasia, Fitzroya, Fourcroya, Gossypium, Hardwickia, Helianthus, Hibiscus, Humulus, Lardizabala, Lavatera, Linum, Maoutia, Musa, Pachyrrhizus, Phormium, Pipturus, Poa, Sansceviera, Sesbania, Spartina, Spartium, Thuya, Tillandsia, Touchardia, Urena, Villebrunea, Yucca.

Fuller's Plant—

Dipsacus.

Fodder Plants—

1. Grasses—

Agrostis, Aira, Alopecurus, Andropogon, Anthistiria, Anthoxanthum, Aristida, Avena, Bouteloua, Bromus, Buchloa, Carex, Cloris, Cinna, Cynodon, Cynosurus, Dactylis, Danthonia, Ehrharta, Eleusine, Euchlaena, Erianthus, Eriochloa, Festuca, Hemarthria, Hierochloa, Holcus, Hordeum, Koeleria, Leersia, Lolium, Melica, Milium, Neurachne, Panicum, Pappophorum, Paspalum, Pennisetum, Phalaris, Phleum,

Poa, Sclerachne, Secale, Sesleria, Spartina, Stenotaphrum, Tricholaena, Tripsacum, Triticum, Uniola, Zizania.

2. Other Herbage—

Achillea, Alchemilla, Anthyllis, Arachis, Astragalus, Atriplex, Brassia, Cichorium, Conospermum, Crotalaria, Desmodium, Erodium, Ervum, Heracleum, Hippocrepis, Jacksonia, Lespedeza, Lotus, Pentzia, Peucedanum, Portulacaria, Prangos, Sanguisorba, Sesbania, Spergula, Symphytum, Trichodesma, Trophis.

3. Stable Pulse (Pods and Herbs)—

Cicer, Dolichos, Hedysarum, Lathyrus, Lupinus, Medicago, Melilotus, Onobrychis, Ornithopus, Oxytropis, Pisum, Trifolium, Trigonella, Vicia.

4. Other Fruits—

Argania, Carya, Castanea, Ceratonia, Helianthus, Prosopis, Quercus.

Garland Plants—

Baccharis, Helichrysum, Laurus, Lycopodium, Melaleuca, Quercus.

Grave Plants—

Boronia, Cupressus, Fraxinus, Helichrysum, Lycopodium, Salix, Tamarix, Thuya, Viola.

Gum Plants—

Acacia, Albizzia, Astragalus, Bambusa, Brachychiton, Caragana, Diospyros, Olea, Piptadenia, Prosopis.

Hedge Plants—

Aberia, Acacia, Acer, Agave, Albizzia, Azema, Baccharis, Bambusa, Berberis, Buxus, Cæsalpinia, Capparis, Carissa, Ceanothus, Celtis, Cratægus, Cupressus, Elæagnus, Flacourtia, Gleditschia, Guilandina, Hymenanthera, Justicia, Lawsonia, Ligustrum, Lycium, Maclura, Mimosa, Opuntia, Paliurus, Parkinsonia, Piereskia, Pisonia, Pistacia, Pittosporum, Plectronia, Prosopis, Prunus, Punica, Pyrus, Rhamnus, Rhus, Rosa, Rubus, Ruscus, Salix, Scotia, Streblus, Thuya, Zizyphus.

Honey Plants—

Acacia, Agave, Brassica, Citrus, Eucalyptus, Eucryphia, Helianthus, Lavandula, Medicago, Melianthus, Melissa,

Mentha, Origanum, Rosa, Rosmarinus, Salvia, Thymus, Tilia, Trifolium, Tropæolum, Viola.

Hop Plant—

Humulus.

Insecticidal Plants—

Chrysanthemum, Schkuhria, Tagetes.

Medicinal Plants—

1. YIELDING HERBAGE OR FLOWERS—

Achillea, Aconitum, Agave, Aletris, Aloe, Althæa, Anemone, Anthemis, Arctostaphylos, Aristolochia, Arnica, Artemisia, Atropa, Barosma, Cannabis, Cassia, Catha, Chelidonium, Chenopodium, Chrysanthemum, Cochlearia, Conium, Crocus, Cytisus, Digitalis, Duboisia, Erythroxylon, Eupatorium, Garuleum, Hagenia, Hedeoma, Hyoscyamus, Ilex, Justicia, Lactuca, Leyssera, Marrubium, Matricaria, Melianthus, Mentha, Menyanthes, Nepeta, Osmitopsis, Papaver, Parthenium, Pilocarpus, Polygala, Prunus, Rafnia, Ricinus, Rosmarinus, Ruta, Salvia, Sambucus, Santolina, Schuhria, Sebia, Selenum, Solanum, Soppora, Spigelia, Spilanthes Swertia, Tanacetum, Tarchonanthus, Teucrium, Thuya, Thymus.

2. YIELDING BARK—

Alstonia, Aspidosperma, Cinchona, Juglans, Pilocarpus, Salix.

3. YIELDING ROOTS—

Acorus, Actæa, Althæa, Anacyclus, Archangelica, Aristolochia, Arnica, Atropa, Carex, Cephælis, Cimicifuga, Colchicum, Convolvulus, Euryangium, Gentiana, Glycyrrhiza, Helleborus, Hydrastis, Inula, Ipomœa, Krameria, Nardostachys, Perinandra, Peucedanum, Pimpinella, Podophyllum, Polygala, Punica, Rafnia, Rheum, Sabbatia, Sanguinaria, Saponaria, Sassafras, Saussurea, Schoenocaulon, Scorzonera, Smilax, Smyrnium, Symphytum, Taraxacum, Urginia, Valeriana, Veratrum, Xanthorrhiza.

4. YIELDING FRUITS (or only Seeds)—

Cassia, Cucumis, Cuminum, Ecballion, Fœniculum, Illicium, Mallotus, Punica, Rhamnus, Rheum, Ricinus, Schoenocaulon, Smyrnium, Tamarindus, Trigonella.

Oil Plants—

Aleurites, Arachis, Argania, Brassica, Camelina, Cannabis, Carya, Combretum, Cucurbita, Cyperus, Excæcaria, Ginkgo, Gossipium, Guizotia, Helianthus, Juglans, Lamellia, Linum, Olea, Papaver, Prunus (Amygdalus), Pyrularia, Ricinus, Sesamum, Telfairia, Tetranthera.

Palm Plants—

Acroconia, Bactris, Bacularia, Borassus, Brahea, Calamus, Caryota, Ceroxylon, Chamærops, Cocos, Copernicia, Euterpe, Geonoma, Hyospathe, Hyphæne, Jubæa, Kentia, Livistona, Mauritia, Oncosperma, Oreodoxa, Phœnix, Plectocomia, Pritchardia, Ptychosperma, Rhapis, Sabal, Trihrinax, Thrinax, Wallichia, Wettinia, Zalacca (many other American genera under Wettinia, many other Asian genera under Zalacca).

Paper Plants—

Arundo, Broussonetia, Cyperus, Fatsia, Lepidosperma, Lygeum, Phormium, Populus, Psamma, Spartina, Stipa, Zea. (See also Fibre Plants.)

Resin Plants—

Acaria, Balsamodendron, Boswellia, Bursera, Batea, Cajanus, Callitris, Ceroxylon, Chloroxylon, Cistus, Croton, Dammara, Dorema, Ferula, Ficus, Frenela, Garcinia, Hymenæa, Isonandra, Juniperus, Liquidambar, Myrica, Pinus, Pistacia, Pterocarpus, Rhus, Shorea, Styrax, Vahea, Widdringtonia.

Saline Plants—

Agrostis, Alopecurus, Albizzia, Avicennia, Batis, Casuarina, Cynodon, Kochia, Leptospermum, Melaleuca, Myoporum, Paspalum, Phormium, Poa, Salicornia, Tamarix, Zoysia.

Sand-coast Plants—

Acacia, Agrostis, Ailantus, Aloe, Apium, Asparagus, Beta, Cæsalpinia, Cakile, Calamagrostis, Carex, Casuarina, Crambe, Crithmum, Cupressus, Cynodon, Cytisus, Dactylis, Distichlis, Ehrharta, Elegia, Elymus, Festuca, Frenela, Genista, Hemitaphrum, Imperata, Lavandula, Lepidosperma, Leptospermum, Lupinus, Medicago, Melaleuca, Mesembrianthemum, Myoporum, Myrcia, Opuntia, Ornithopus, Panicum, Paspalum, Phormium, Pinus, Poa, Populus, Prunus, Psamma, Quercus, Rhagodia, Robinia, Rumerea, Sabal, Salix, Sesuvium, Spartina, Spinifex, Stenotaphrum, Stipa, Tamarix, Tetragonia, Thouarea, Thrinax, Tripsacum, Triticum, Ulex, Uniola, Urginia, Yucca, Zoysia.

Scenic Plants (other than Palms or Bamboos)—

Agave, Ailanthus, Aloe, Andropogon, Angelica, Arundo, Asplenium, Berberis, Boehmeria, Canna, Cereus, Colocasia, Cordyline, Cycus, Cynara, Cyperus, Datura, Dicksonia, Direa, Elegia, Encephalartos, Euchlana, Eustrephus, Fatsia, Ferula, Festuca, Fœniculum, Fourcroya, Gunnera, Helianthus, Heracleum, Inula, Lavatera, Leucadendron, Melianthus, Musa, Opuntia, Pandanus, Pawlownia, Phormium, Pipturus, Podachænium, Rheum, Richardia, Ricinus, Todea, Touchardia, Watsonia, Yucca, Zea.

Scent Plants—

Acacia, Adesmia, Aloexylon, Andropogon, Anthoxanthum, Aquilaria, Backhousia, Boronia, Calamintha, Cedronella, Citrus, Convolvulus, Dracocephalum, Eucalyptus, Gelsemium, Lavandula, Liatris, Lippia, Liquidambar, Melia, Melissa, Mentha, Monarda, Myrtus, Nyctanthes, Ocimum, Origanum, Ormanthus, Pelargonium, Pittosporum, Pogostemon, Polianthes, Prunus (Amygdalus), Pycnanthemum, Reseda, Rosa, Rosmarinus, Santalum, Satureja, Styrax, Synoon, Teucrium, Thymus, Tilia, Triphasia, Viola, Westaria.

Silk Plants—

Ailantus, Cajanus, Liquidambar, Morus, Quercus, Recinus, Shorea, Symplocos, Terminalia, Trophis, Ulmus.

Starch Plants—

Alstroemeria, Canna, Caryota, Colocasia, Copernicia, Cycas, Fagopyrum, Hordeum, Levisia, Manihot, Maranta, Oreodoxa, Oryza, Secale, Solanum, Tacca, Triticum, Zea.

Sugar Plants—

Acer, Andropogon, Beta, Borassus, Caryota, Comptonia, Copernicia, Cucumis, Euchlæna, Phœnix, Saccharum, Zea.

Tannic Plants—

Acacia, Æsculus, Alnus, Albizzia, Angophora, Aspidosperma, Banksia, Butea, Cæsalpinia, Cedrela, Coccoloba, Comptonia, Cytisus, Davana, Eucalyptus, Eugenia, Gordonia, Gunnera, Pinus, Populus, Prosopis, Pterocarpus, Quercus, Rhus, Salix, Terminalia.

Tea Plants—

Andropogon, Camellia, Hydrandgea, Ilex.

Tide Plants—

Ægiceras, Avicennia, Batis, Myoporum, Salitarnia, Spartina

Timber Plants—

1. Trees, coniferous—

a. Evergreen—

Araucaria, Cephalotaxus, Cryptomeria, Cupressus, Dacrydium, Dammara, Fitzroya, Frenela, Juniperus, Libocidrus Nageia, Phyllocladus, Pinus, Saxono-Gotæa, Sciadopitys Sequoia, Taxus, Thuya, Thuyopsis, Torreya, Widdringtonia

b. Deciduous—

Ginkgo, Pinus, Taxodium.

2. Trees, not coniferous—

a. Evergreen—

Acacia, Adenostemon, Albizzia, Amyris, Angophora, Aspidosperma, Brachychiton, Castanopsis, Casuarina, Cedrela, Cercocarpus, Chloroxylon, Corynocarpus, Dalbergia, Diospyros, Embothrium, Eucalyptus, Eucryphia, Fagus, Ficus, Flindersia, Gonioma, Gordonia, Gourliaca, Grevillea, Harpullia, Hymenæa, Iacaranda, Knightia, Laurelia, Maba, Magnolia, Marlea, Maytenus, Metrosideros, Myrtus, Persea, Peumus, Psychotria, Quercus, Rhus, Royenia, Santalum, Shorea, Swietenia, Syncarpia, Tectona, Tetranthera, Tristania.

b. Deciduous—

Acer, Æsculus, Ailantus, Alnus, Betula, Butea, Carpinus, Carya, Castanea, Catalpa, Celtis, Corylus, Diospyros, Engelhardtia, Excæcaria, Fagus, Fraxinus, Gleditschia, Gymnocladus, Holoptelea, Juglans, Liriodendron, Magnolia, Melia, Ostrya, Pircunia, Planera, Platanus, Populus, Pterocarpus, Pterocarya, Quercus, Robinia, Salix, Sophora, Tilia, Ulmus, Zelkova.

Tobacco Plants—

Nicotiana.

Water Plants—

Acorus, Æschynomene, Aponogeton, Butomus, Cyperus, Euryale, Menyanthes, Nelumbo, Nuphar, Nyssa, Oryza, Poa, Richardia, Sagittaria, Trapa, Zizania.

Wicker Plants—

Cyperus, Parrotia, Salix (also genera mentioned under Bamboo Plants).

SYSTEMATIC INDEX OF GENERA.

DICATYLEDONEÆ.

Ranunculaceæ.
Aconitum.
Actæa.
Anemone.
Cimicifuga.
Helleborus.
Hydrastis.
Xanthorrhiza.

Nymphæaceæ.
Nelumbo.
Nuphar.

Magnoliaceæ.
Drimys.
Illicium.
Liriodendron.
Magnolia.
Michelia.

Calycantheæ.
Calycanthus.

Anonaceæ.
Anona.
Monodora.

Laurineæ.
Adenostemum.
Cinnamomum.
Laurus.
Lindera.
Persea.
Sassafras.
Tetranthera.

Monimieæ.
Laurelia.
Peumus.

Berberideæ.
Berberis.
Bongardia.
Lardizabala.
Podophyllum.

Papaveraceæ.
Chelidonum.
Papaver.
Sanguinaria.

Cruciferæ.
Barbaræa.
Brassica.
Cakile.
Camelina.
Cochlearia.
Crambe.
Isatis.
Lepidium.
Pringlea.
Raphanus.

Capparideæ.
Capparis.

Violaceæ.
Hymenanthera.
Viola.

Moringaceæ.
Moringa.

Bixaceæ.
Aberia.

Cistaceæ.
Cistus.

Resedaceæ.
Reseda.

Pittosporeæ.
Pittosporum.

Polygalaceæ.
Krameria.
Polygala.

Guttiferæ.
Garcinia.

Ternstrœmiaceæ.
Camellia.
Gordonia.
Schima.

Dipterocarpeæ
Shorea.

Linaceæ.
Erythroxylon.
Linum.

Geraniaceæ.
Averrhoa.
Oxalis.
Pelargonium.
Tropæolum.

Malvaceæ.
Althæa.
Gossypium.
Hibiscus.
Urena.

Sterculiaceæ.
Brachychiton.
Sterculia.

Tiliaceæ.
Aristotelia.
Corchorus.
Tilia.

Rutaceæ.
Atalantia.
Barosma.
Boronia.
Casimiroa.
Citrus.
Limonia.
Murraya.
Pilocarpus.
Ruta.
Triphasia.

Simarubeæ.
Ailantus.

Anacardiaceæ.
Corynocarpus.
Mangifera.
Odina.
Pistacia.
Rhus.
Spondias.

Burseraceæ.
Amyris.
Balsamodendron.
Boswellia.

Olacinæ.
Ximenia.

Meliaceæ.
Cedrela.
Chloroxylon.
Flindersia.
Melia.
Synoon.
Swietenia.

Sapindaceæ.
Acer.
Æsculus.
Blighia.
Harpullia.
Melianthus.
Melicocca.
Nephelium.
Pappea.

Viniferæ.
Vitis.

Celastrineæ.
Catha.
Maytenus.

Rhamnaceæ.
Ceanothus.
Colletia.
Condalia.
Hovenia.
Paliurus.
Rhamnus.
Scutia.
Zizyphus.

Aquifoliaceæ.
Ilex.

Tamariscineæ.
Tamarix.

Cacteæ.
Cereus.
Opuntia.
Peireskia.

Ficoideæ.
Mesembrianthemum.
Sesuvium.
Tetragonia.

Caryophylleæ.
Saponaria.
Spergula.

Portulaceæ.
Lewisia.
Talinum.

Amarantaceæ.
Amarantus.

Salsolaceæ.
Agriophyllum.
Atriplex.
Basella.
Beta.
Boussingaultia.
Chenopodium.
Rhagodia.
Spinacia.
Theligonum.
Ullucus.

Polygonaceæ.
Calligonum.
Coccoloba.
Polygonum.
Rheum.
Rumex.

Nyctagineæ.
Pisonia.

Phytolacceæ.
Pircunia.

Aristolachiaceæ.
Aristolachia.

Hamamelidæ.
Liquidambar.
Parrotia.

Halorageæ.
Batis.
Gunnera.

Rosaceæ.
Alchemilla.
Amelanchier.
Cercocarpus.
Cratægus.
Fragaria.
Hagenia.
Parinarium.
Prunus.
Pyrus.
Quillaja.
Rosa.
Rubus.
Sanguisorba.

Leguminosæ.
Acacia.
Adesmia.
Æschinomene.
Albizzia.
Aloexylon.
Anthyllis.
Apios.
Arachis.
Astragalus.
Buddleya.
Butea.
Cæsalpinia.
Cajanus.
Canavalia.
Caragana.
Cassia.
Ceratonia.
Cercis.
Cicer.
Cladastris.
Crotalaria.
Cyamopsis.
Cytisus.
Dalbergia.
Desmodium.
Dolichos.
Ervum.
Genista.
Gleditchia.
Glycine.
Glycyrrhiza.
Gymnocladus.
Hardwickia.
Hedysarum.
Hippocrepis.
Hymenæa.
Indigofera.
Jacksonia.
Lathyrus.
Lespedeza.

Lotus.
Lupinus.
Medicago.
Meliotus.
Mimosa.
Onobrychis.
Ornithopus.
Oxytropis.
Pachyrrizus.
Parkinsonia.
Peltophorum.
Periandra.
Phaseolus.
Piptadenia.
Pisum.
Prosopis.
Psoralea.
Pterocarpus.
Pueraria.
Rafnia.
Robinia.
Sesbania.
Sophora.
Spartium.
Tamarindus.
Trifolium.
Trigonella.
Ulex.
Vicia.
Vigna.
Voandzeia.
Wistaria.

Saxifrageæ.

Eucryphia.
Hydrangea.
Ribes.

Myrtaceæ.

Angophora.
Backhousia.
Calyptranthes.
Eucaliptus.
Eugenia.
Leptospermum.
Marliera.
Melaleuca.
Metrosideros.
Myrtus.
Psidium.
Tristania.

Combretaceæ.

Combretum.
Terminalia.

Onagreæ.

Trapa.

Lythraceæ.

Lawsonia.
Punica.

Euphorbiaceæ.

Aleurites.
Baloghia.
Buxus.
Croton.
Crozophora.
Mallotus.
Manihot.
Ricinus.

Urticaceæ.

Artocarpus.
Boehmeria.
Broussonetia.
Cannabis.
Celtis.
Cudrania.
Debregeasia.
Holoptelea.
Humulus.
Maclura.
Maoutia.
Morus.
Planera.
Pipturus.
Ponzolzia.
Streblus.
Touchardia.
Trophis.
Ulmus.
Villebrunia.
Zelkova.

Juglandeæ.

Carya.
Engelhardtia.
Juglans.

Amentaceæ.

Alnus.
Betula.
Carpinus.
Castanea.
Castanopsis.
Corylus.
Myrica.
Ostrya.
Platanus.
Populus.
Quercus.
Salix.

Passifloreæ.

Carica.
Passiflora.

Cucurbitaceæ.

Acanthosicyos.
Benincasa.
Corynosicyos.
Cucumis.
Cucurbita.
Ecballion.
Sechium.
Telfairia.

Santalaceæ.

Cervantesia.
Pyrularia.
Santalum.

Proteaceæ.

Conospermum.
Embathrium.
Grevillea.
Guevina.
Leucodendron.
Macadamia.

Thymeleæ.

Aquilaria.
Dirca.
Thymelæa.

Elæagneæ.

Elæagnus.
Shepherdia.

Cornaceæ.

Cornus.
Marlea.
Nyssa.

Umbelliferæ.

Anthriscus.
Apium.
Aracacha.
Aralia.
Archangelica.
Carum.
Chærophyllum.
Conium.
Conopodium.
Coriandrum.
Crithmum.
Cuminum.

Cymopterus.
Daucus.
Diposis.
Dorema.
Heracleum.
Laserpitium.
Myrrhis.
Peucedanum.
Pimpinella.
Prangos.
Scandix.
Selinum.
Sison.
Smyrnium.
Stilbocarpa.
Thapsia.
Tinguarra.

Rubiaceæ.

Alibertia.
Cephælis.
Cinchona.
Coffea.
Plectronia.
Psychatia.
Rubia.
Vangueria.

Valerianeæ.

Nardostachys.
Valeriana.
Valerianella.

Dipsaceæ.

Dipsacus.

Compositæ.

Achillea.
Anacyclus.
Anthemis.
Arnica.
Artemisia.
Baccharis.
Carthamus.
Cichorium.
Chrysanthemum.
Cynara.
Garuleum.
Guizotia.
Helianthus.
Helichrysum.
Heterothalamus.
Hypochoeria.
Inula.
Lactuca.
Leysera.
Liatris.
Matricaria.
Microseris.
Osmitopsis.
Parthenium.
Pentzia.
Podachanium.
Rhaponticum.
Santolina.
Saussurea.
Sehkuhria.
Scorzonera.
Spilanthes.
Tagetes.
Tanacetum.
Taraxacum.
Tarchonanthus.
Tragopogon.

Ericaceæ.

Arbutus.
Archostaphylos (Comarostaphylos).
Gaultiera.
Gaylussacia.
Rhododendron.
Vaccinum.

Styraceæ.

Styrax.
Symplocos.

Ebenaceæ.

Diospyros.
Euclea.
Maba.
Royenia.

Sapotaceæ.

Achras.
Argania.
Bassia.
Dichopsis.
Isonandra.
Niemeyera.

Myrsinaceæ.

Ægiceras.

Oleaceæ.

Azima.
Fraxinus.
Jasminium.
Ligustrum.
Nyctanthes.
Olea.
Osmanthus.

Apocyneæ.

Alstonia.
Apocynum.
Aspidosperma.
Carissa.
Gonioma.
Vahea.

Loganiaceæ.

Gelsenium.
Spigelia.

Gentianeæ.

Gentiana.
Menyanthes.
Sabbatia.
Sebæa.
Swertia.

Convolvulaceæ.

Convolvulus.
Ipomœa.

Solanaceæ.

Atropa.
Basavia (Witheringia).
Capsicum.
Duboisia.
Hyoscyamus.
Lycium.
Nicotiana.
Physalis.
Salpichroma.
Solanum.

Scrophularinæ.

Digitalis.
Lyperia.

Acanthaceæ.

Justicia.

Bignoniaceæ.

Catalpa.
Jaracanda.

Pedalinæ.

Sesamum.

Asperifoliæ.

Alkana.
Borrago.
Heliotropium.
Lithosperum.
Onosma (Maharanga).

Symphytum.
Trichodesma.

Labiatæ.

Calamintha.
Cedronella.
Dracocephalum.
Hedesma.
Lavandula.
Melissa.
Mentha.
Meriandra.
Monarda.
Ocimum.
Origanum.
Pogostemon.
Perilla.
Pycnanthemum.
Rosmarinus.
Salvia.
Satureja.
Teucrium.
Thymus.

Verbenaceæ.

Avicennia.
Lippia.
Priva.
Tectona.

Myoporeæ.

Myoporum.

Casuarinæ.

Casuarina.

Coniferæ.

Araucaria.
Callistris.
Cephalotaxus.
Crytomeria.
Cupressus.
Dacrydium.
Dammara.
Fitzroya.
Frenola.
Gingko.
Glyptostrobus.
Juniperus.
Libacedrus.
Nageia.
Phyllocladus.
Pinus.
Saxona-Gothæa.
Sciadopithys.
Sequoia.
Taxodium.
Taxus.
Thuia.
Thuiopsis.
Torreya.
Widdringtonia.

Cycadeæ.

Cycas.
Encephartos.

MONOCOTYLEDONEÆ.

Musaceæ.

Musa.

Scitaminæ.

Canna.
Maranta.
Zingiber.

Bromeliaceæ.

Tillandsia.

Taccaceæ.

Tacca.

Dioscorideæ.

Dioscorea.

Irideæ.

Crocus.

Amaryllideæ.

Aletris.
Agave.
Alstrœmeria.
Fourcroya.
Polianthes.

Liliaceæ.

Aloe.
Allium.
Asparagus.
Chlorogalum.
Colchicum.
Cordyline.
Geitonoplesium.
Lapageria.
Phormium.
Ruscus.
Sanseviera.
Schœnocaulon.
Scilla.
Smilax.
Urginia.
Uvularia.
Veratrum.
Yucca.

Alismaceæ.

Aponogeton.
Butomus.
Sagittaria.

Aroideæ.

Acorus.
Colocasia.
Richardia.

Pandanaceæ.

Pandanus.

Palmaceæ.

Acanthophœnix.
Acrocomia.
Bactris.
Brahea.
Borassus.
Calamus.
Calytronoma.
Caryota.
Ceroxylon.
Chamærops.
Cocos.
Copernicia.
Dypsis.
Geonoma.
Hearina.
Hyphæne.
Hyospathe.
Jubæa.
Kentia.
Livistona.
Mauritia.
Oncosperma.
Oreodoxa.
Phœnix.

Plectocomia.
Ptychosperma.
Rhapis.
Sabal.
Thrinax.
Tritrinax.
Wallichia.
Wettinia.
Zalacca.

Rustiaceæ.

Elegia.

Cyperaceæ.

Carex.
Cyperus.
Lepidosperma.
Lepironia.

Gramineæ.

Agrostis.
Aira.
Alopecurus.
Andropogon.
Anthistiria.
Anthoxanthum.
Aristida.
Arundinaria.
Arundo.
Avena.
Bambusa.
Beesha.
Boutelona.
Bromus.
Buchloa.
Calamagrostis.
Chionachne (Sclerachne).
Chloris.
Cinna.
Cynodon.
Cynosurus.
Dactylis.
Danthonia.
Dendrocalamus.
Ehrharta.
Eleusine.
Elymus.
Erianthus.
Eriochloa.
Euchlæna.
Festuca.
Gigantochloa.
Guadua.
Hemarthria.
Hierochloa.
Holcus.
Hordeum.
Imperata.
Koeleria.
Leersia.
Lolium.
Lygeum.
Melica.
Milium.
Milocanna.
Nastus.
Neurachne.
Oryza.
Oxytenanthera.
Panicum.
Pappophorum.
Paspalum.
Pennisetum.
Phalaris.
Phleum.
Phyllostachys.
Poa.
Saccharum.
Schizostachyum.
Secale.
Sesleria.
Spartina.
Spinifex.
Stenotaphrum.
Stipa.
Teinotachyum.
Thouarea.
Tricholæna.
Tripsacum.
Triticum.
Uniola.
Zea.
Zizania.
Zoysia.

ACOTYLEDONEÆ.

Filices.

Cyathea.
Dicksonia.
Lycopodium.
Todea.

Lichones.

Roccella.

Fungaceæ.

Agarincus.
Boletus.
Cantharellus.
Clavaria.
Helvella.
Hydnum.
Morchella.
Pachyma.
Peziza.
Polygaster.
Polyporus.
Rhizopogon.
Terfesia.
Tuber.

GEOGRAPHIC INDEX.

NORTHERN AND MIDDLE EUROPE.

Acer campestre, A. platanoides, A. pseudo-platanus, Achillea atrata, A. millefolium, A. moschata, A. nana, Aconitum Napellus, Acorus Calamus, Actæa spicata, Agaricus auricula, A. campestris, A. decorus, A. fusipes, A. gambosus, A. procerus, A. scorodonius, A. sylvaticus, A. virgineus, A. volemus, A. cæsareus, A. Cardarella, A. deliciosus, A. eryngii, A. esculentus, A. extinctorius, A. giganteus, A. Marzuolus, A. melleus, A. Mouceron, A. odorus, A. oreades, A. socialis, A. splendens, Agrostis alba, A. rubra, A. vulgaris, Aira cæspitosa, Alchemilla Alpina, A. vulgaris, Allium Schœnoprasum, A. Scorodoprasum, Alnus glutinosa, A. incana, Alopecurus bulbosus, A. geniculatus, A. pratensis, Althæa officinalis, Anemone Pulsatilla, Anthemis nobilis, A. tinctoria, Anthriscus Cerefolium, Archangelica officinalis, Arctostaphylos uva-ursi, Arnica montana, Artemisia Absinthium, A. Mutellina, A. Pontica, Asparagus officinalis, Asperula odorata, Astragalus arenarius, A. glycyphyllos, A. hypoglottis, Atropa Belladonna, Avena elatior, A. fatua, A. flavescens, A. pubescens, A. sativa, Barbaræa vulgaris, Beta vulgaris, Betula alba, Boletus bovinus, B. circinans, B. edulis, B. luteus, B. sapidus, B. scaber, B. subtomentosus, B. variegatus, Brassica alba, B. Napus, B. nigra, B. oleracea, B. Rapa, Bromus asper, Cakile maritima, Calamintha officinalis, Camelina sativa, Canthanellus edulis, Carex arenaria, Carpinus Betulus, Carum Bulbocastanum, C. Carui, C. segetum, Chæromyces meandriformis, Chærophyllum bulbosum, C. sativum, Chenopodium Bonus Henricus, Cichorium Intybus, Clavaria aurea, C. botrytis, C. brevipes, C. coralloides, C. crispa, C. flava, C. formosa, C. grisea, C. muscoides, C. palmata, Cochlearia Armoracia, C. officinalis, Colchicum autumnale, Conium maculatum, Corylus Avellana, Crambe maritima, Cratægus Oryacantha, Cynosurus cristatus, Cytisus scoparius, Dactylis glomerata, Daucus Carota, Digitalis purpurea, Dipsacus fullonum, Elymus arenarius, Fagus sylvatica, Festuca arundinacea, F. drymeia, F. duriuscula, F. elatior, F. gigantea, F. heterophylla, F. loliacea, F. ovina, F. pratensis, F. rubra, F. silvatica, F. spadicea, Fragaria collina, F. vesca, Fraxinus excelsior, Gentiana lutea, Geum urbanum, Helleborus niger, Helvella esculenta, H. gigas, H. infula, Heracleum Sibiricum, Holcus lanatus, H. mollis, Hordeum nodosum, Humulus Lupulus, Hydnum album, H. auriscalpium, H. Caput-Medusæ, H. coralloides, H. diversidens, H. erinaceum, H. fuligineo-album, H. graveolens, H. repandum, H. suaveolens, H. hystrix, H. imbricatum, H. infundibulum, H. laevigatum, H. subsquamosum, H. violascens, Hyoscyamus niger, Ilex Aquifolium, Inula Helenium, Juniperus communis, Lactuca virosa, Laserpitium aquilegium, Lathyrus macrorrhizus, L. pratensis, L. sativus, Lavatera arborea, Leersia oryzoides, Lolium perenne, Lotus corniculatus, L. major, Marrubium vulgare, Matricaria Chamomilla, Medicago falcata, M. sativa, Melica altissima, M. ciliata, M. nutans, M. uniflora, Melilotus alba, M. officinalis, Mentha citrata, M. crispa, M. piperita, M. Pulegium, M. rotundifolia, M. sylvestris, M. viridis, Myneanthes trifoliata, Milium effusum, morchella deliciosa, M. esculenta, M. Gigas, M. patula, Nepeta Gleehoma, Onobrychis sativa, Origanum vulgare, Peucedanum officinale, P. Ostruthium, P. sativum, Pezica macropus, Phleum Alpinum, P. pratense, Physalis Alkekengi, Pimpinella saxifraga, Pinus Abies, P. Cembra, P. Larix, P. montana, P. picea, P. silvestris, Poa airoides, P. Alpina, P. angustifolia, P. aquatica, P. distans, P. fertilis, P. fluitans, P. maritima, P. nemoralis, P. pratensis, P. trivialis, Polyporus citrineus, P. frondosus, P. giganteus, P. ovinus, P. tuberaster, Populus alba, P. canescens, P. dilatata, P. fastigiata, P. nigra, P. tremula, Prunus Mahaleb, P. spinosa, Psamma arenaria, P. Baltica, Pyrus Germanica, P. nivalis, Quercus Robur, Reseda Luteola, Rhamnus catharticus, Rhizopogon magnatum, R. rubescens, Ribes Grossularia, R. nigrum, R. rubrum, Rosa Gallica, R. spinosissima, Rubia peregrina, Rubus cæsius, R. Chamæmorus, R. fruticosus R. Idæus, Rumex acetosus, R. scutatus, Ruscus aculeatus, Salix alba,

S. caprea, S. daphnoides, S. fragilis, S. lanceolata, S. purpurea, S. rubra, S. triandra, S. viminalis, Sambucus nigra, Sanguisorba minor, Saponaria officinalis, Scorzonera Hispanica, Sesleria coerulea, Sison Amomum, Smyrnium Olusatrum, Solanum Dulcamara, Spartina stricta, Spergula arvensis, Tanacetum vulgare, Taraxacum officinale, Tilia Europæa, Tragopogon porrifolium, Trapa natans, Trifolium agrarium, T. Alpestre, T. fragiferum, T. hybridum, T. incarnatum, T. mydium, T. montanum, T. ochroleucum, T. Pannonicum, T. pratense, T. repens, T. spadiceum, Triticum junceum, Tuber æstivum, T. albidum, T. cibarium, T. magnatum, T. melanosporum, Ulex Europæus, Ulmus campestris, U. pedunculata, Vaccinium Myrtillus, V. oxycoccus, V. uliginosum, V. Vitis-Idæa, Valeriana Celtica, Valerianella olitoria, Veratrum, album, Vicia sativa, V. sepium, V. sylvatica, Viola odorata.

COUNTRIES ON OR NEAR THE MEDITERRANEAN SEA.

Acacia Arabica, A. Seyal, A. tortilis, A. Verek, Acer Creticum, Achillea fragrantissima, Ægilops ovata, Æsculus Hippocastanum, Agaricus cæsareus, Agrostis alba, A. vulgaris, Aira cæspitosa, Alchemilla vulgaris, Alkanna tinctoria, Allium Ascalonicum, A. Cepa, A. Neapolitanum, A. Porrum, A. roseum, A. Scorodoprasum, A. sativum, Aloe vulgaris, Alopecurus bulbosus, A. geniculatus, A. pratensis, Althæa officinalis, Amarantus Blitum, Anacyclus Pyrethrum, Andropogon Gryllos, A. Haleppensis, A. Schoenanthus, Anthemis nobilis, A. tinctoria, Anthoxanthum odoratum, Anthyllis vulneraria, Apium graveolens, Argania sideroxylon, Artemisia Absinthium, A. Pontica, Arundo ampelodesmos, A. Donax, A. Pliniana, Asparagus acutifolius, A. albus, A. aphyllus, A. horridus, A. officinalis, Astragalus Cephalonicus, A. Cicer, A. Creticus, A. gummifer, A. Parnassi, A. strobiliferus, A. venosus, A. verus, Atropa Belladonna, Avena elatior, A. fatua, A. flavescens, A. pubescens, A. sativa, Balsamodendron Ehrenbergii, B. Mukul, B. Opobalsamum, Beta vulgaris, Betula alba, Bongardia Rauwolfii, Borassus Æthiopicus, Borrago officinalis, Brassica alba, B. Campestris, B. Cretica, B. juncea, B. Napus, B. nigra, B. oleracea, B. Rapa, Bromus erectus, Buxus Balearica, B. longifolia, B. sempervirens, Cajanus Indicus, Cakile maritima, Calamintha Nepeta, C. officinalis, Callitris quadrivalvis, Camelina sativa, Cannabis sativa, Capparis spinosa, Carpinus Betulus, Carthamus tinctorius, Carum Bulbocastanum, C. Carui, C. ferulifolium, C. Petroselinum, C. segetum, Cassia acutifolia, C. angustifolia, C. obovata, Castanea sativa, Catha edulis, Cedronella triphylla, Celtis Australis, Ceratonia Siliqua, Chœrophyllum bulbosum, C. sativum, Chamærops humilis, Chelidonium majus, Chenopodium Blitum, Chrysanthemum carneum, C. roseum, Cicer arietinum, Cichorium Endivia, C. Intybus, Cistus Creticus, C. Cyprius, Cochlearia Armoracia, Coffea Arabica, Colchicum autumnale, Colocasia antiquorum, Conium maculatum, Conopodium denudatum, Convolvulus floridus, C. Scammonia, C. scoparius, Coriandrum sativum, Corylus Colurna, Corynosicyos edulis, Crambe cordifolia, C. Klotschyana, C. maritima, C. Tataria, Cratægus Azarolus, C. Oxyacantha, C. pyracantha, Crithmum maritimum, Crocus sativus, C. serotinus, Crozophora tinctoria, Cucumis Citrellus, C. Colocynthis, C. Melo, C. sativus, Cucurbita maxima, C. Melopepo, C. moschata, C. Pepo, Cuminum Cyminum, C. Hispanicum, Cupressus sempervirens, Cynara Cardunculus, C. Scolymus, Cynodon Dactylon, Cynosurus cristatus, Cyperus esculentus, C. Papyrus, C. proliferus, C. Syriacus, Cytisus scoparius, Dactylis glomerata, D. litoralis, Daphne Mazereum, Daucus Carota, Digitalis purpurea, Diospyros Lotus, Dipsacus fullonum, Dolichos Lablab, D. uniflorus, Dorema ammoniacum, Dracocephalum Maldavica, Ecballion Elaterium, Eleusine flagelligera, E. Tocussa, Elymus arenarius, Ervum Lens, Fagopyrum esculentum, F. Tataricum, Fagus sylvatica, Ferula galbaniflua, F. longifolia, Festuca elatior, F. gigantea, F. sylvatica, Ficus Carica, F. Sycamorus, Fœniculum officinale, Fragaria collina, F. pratensis, F. vesca, Fraxinus excelsior, F. Ornus, Genista monosperma, G. sphærocarpa, Gentiana lutea, Geum urbanum, Glycyrrhiza echinata, G. glabra, Gossypium arboreum, Guilandina Bonduc, G. Bonducella, Hedysarum coronarium, Helichrysum orientale, Helleborus niger, Hippocrepis comosa, Holcus lanatus, H. mollis, Hordeum deficiens, H. distichon, H. hexastichon, H. macrolepis, H. nodosum, H. vulgare, H. zeocriton, Humulus Lupulus, Hydnum imbricatum, Hyoscyamus niger, Hyphæne Argun, H. coriacea, Imperata arundinacea, Indigofera argentea, Inula Helenium, Iris Florentina, I. juncea, Isatis tinctoria, Jasminum odoratissimum, J. officinale, Juglans regia,

Juniperus brevifolia, J. Cedrus, J. drupacea, J. excelsa, J. fœtidissima, J. Phœnicea, J. procera, Koeleria cristata, K. glauca, Lactuca virosa, Lathyrus Cicera, L. pratensis, L. tuberosus, Laserpitium aquilegium, Laurus nobilis, Lavandula angustifolia, L. latifolia, L. Stœchas, Lavatera arborea, Lawsonia alba, Leersia oryzoides, Lepidium latifolium, L. sativum, Linum usitatissimum, Liquidambar Altingia, L. orientalis, Lolium Italicum, L. perenne, Lotus corniculatus, L. major, L. siliquosus, L. tetragonolobus, Lupinus albus, L. angustifolius, L. luteus, L. varius, Lycium Afrum, Lygeum Spartum, Marrubium vulgare, Matricaria Chamomilla, Medicago arborea, M. lupulina, M. media, M. sativa, Melica ciliata, M. nutans, M. uniflora, Melilotus alba, M. cœrulea, M. macrorrhiza, M. officinalis, Melissa officinalis, Mentha citrata, M. crispa, M. piperita, M. Pulegium, M. rotundifolia, M. sylvestris M. viridis, Menyanthes trifoliata, Meriandra Abyssinica, Milium effusum, Morchella deliciosa, M. esculenta, Moringa aptera, Morus nigra, Musa Ensete, M. Livingstoniana, Myrica Faya, Myrrhis odorata, Myrtus communis, Nelumbo nucifera, Nicotiana Persica, Ocimum basilicum, O. sanctum, O. suave, Olea Europæa, Onobrychis sativa, Origanum Dictamnus, O. hirtum, O. Majorana, O. Maru, O. normale, O. Onites, O. virens, O vulgare, Ornithopus sativus, Ostrya carpinifolia, Oxytenanthera Abyssinica, Oxytropis pilosa, Paliurus Spina-Christi, Panicum brizanthemum, P. Crus-Galli, P. glabrum, P. maximum, P. prostratum, P. repens, P. sanguinale, P. spectabile, P. turgidum, Papaver somniferum, Pennisetum thyphoideum, Persea Teneriffæ, Peucedanum cachry-difolium, P. officinale, Phalaris aquatica, P. brachystachys, P. Canariensis, P. minor, P. truncata, Phaseolus coccineus, Phleum Alpinum, P. pratense, Phœnix dactylifera, Physalis Alkekengi, P. angulata, Pimpinella Anisum, P. magna, P. nigra, P. saxifraga, P. Sisarum, Pinus Abies, P. Canariensis, P. Cedrus, P. Cembra, P. Cilicica, P. Haleppensis, P. Laricio, P. Larix, P. montana, P. orientalis, P. Pinaster, P. Pinea, P. Pinsapo, P. Pyrenaica, Pistacia Atlantica, P. Lentiscus, P. Terebinthus, P. vera, Peucedanum sativum, Platanus orientalis, Poa Abyssinica, P. airoides, P. angustifolia, P. aquatica, P. cynosuroides, P. distans, P. fluitans, P. maritima, P. nemoralis, P. trivialis, Populus alba, P. canescens, P. dilatata, P. Euphratica, P. fastigiata, P. nigra, P. tremula, Prosopis Stephaniana, Prunus Amygdalus, P. Armenica, P. avium, P. Cerasus, P. domestica, P. Lauro-Cerasus, P. Mahaleb, P. Padus, P. Persica, P. spinosa, Psamma arenaria, Pugionium cornutum, Punica granatum, Pyrus communis, P. Cydonia, P. malus, P. nivalis, P. salicifolia, Quercus Ægilops, Q. Cerris, Q. coccifera, Q. Ilex, Q. infectoria, Q. macrolepis, Q. Robur, Q. Suber, Q. Toza, Reseda luteola, R. odorata, Rhamnus amygdalinus, R. catharticus, R. Græcus, R. infectorius, R. oleoides, R. prunifolius, R. saxatilis, R. Trangula, Rhaponticum acaule, Rheum Rhaponticum, Rhus Coriaria, R. Cotinus, Ribes Grossularia, R. nigrum, R. rubrum, Richardia Africana, Ricinus communis, Rocella tinctoria, Rosa centifolia, R. Damascena, R. Gallica, R. moschata, R. sempervirens, R. spinosissima, Rosmarinus officinalis, Rubia peregrina, R. tinctorium, Rubus fruticosus, R. Idæus, Rumex acetosus, R. scutatus, Ruscus aculeatus, Ruta graveolens, R. sylvestris, Sagittaria sagittifolia, Salix alba, S. Babylonica, S. daphnoides, S. fragilis, S. purpurea, S. rubra, S. viminalis, Salvia officinalis, Sambucus nigra, Sanguisorba minor, Santolina Cyparissias, Saponaria officinalis, Satureja Græca, S. hortensis, S. Juliana, S. montana, S. Thymbra, Saussurea Lappa, Scandix grandiflora, Scorzonera Astrachanica, S. crocifolia, S. deliciosa, S. Hispanica, S. lanata, S. ramosa, S. Scowitzii, S. semicana, S. tuberosa, S. undulata, Secale cereale, Seslania Ægyptica, Sesuvium Portulacastrum, Sison Amomum, Smilax aspera, Smyrnium Olusatrum, Solanum Æthiopicum, S. Dulcamara, S. edule, S. xanthocarpum, Spartina stricta, Spartium junceum, Spergula arvensis, Spinacia tetrandra, Stenotaphrum Americanum, Stipa arenaria, S. tenacissima, Styrax officinalis, Symphytum asperrimum, S. officinale, Tamarindus Indica, Tamarix articulata, T. Gallica, T. Germanica, Tanacetum vulgare, Taraxacum officinale, Taxus baccata, Terfezia Leonis, Teucrium Chamædrys, T. Creticum, T. Marum, T. Polium, T. Scordium, Thapsia edulis, Theligonum Cynocrambe, Thouarea sarmentosa, Thymelæa tinctoria, Thymus æstivus, T. capitatus, T. hiemalis, T. Mastichina, T. Serpillum, T. vulgaris, Tilia argentea, T. Europæa, Tinguarra Sicula, Tragopogon porrifolius, Trapa natans, Trichodesma Zeylanicum, Trifolium agrarium, T. Alexandrinum, T. Alpestre, T. fragiferum, T. hybridum, T. incarnatum, T. medium, T. montanum, T. ochroleucum, T. pratense, T. quartinianum, T. repens, T. resupinatum, T.

spadiceum, T. subrotundum, Trigonella Fœnum-Græcum, Triticum junceum, T. vulgare, Tuber æstivum, T. albidum, T. cibarium, T. magnatum, Ulex Europæus, Ulmus campestris, U. pedunculata, Urginia Scilla, Vaccinium arctostaphylos, V. Myrtillus, V. oxycoccus, V. uliginosum, V. Vitis-Idæa, Valeriana officinalis, Valerianella olitoria, Veratrum album, Vicia Cracca, V. Ervillia, V. Faba, V. peregrina, V. sativa, V. sepium, V. sylvatica, V. tetrasperma, Viola odorata, Vitis Schimperiana, V. vinifera, Zelkova crenata, Z. Cretica, Zizyphus Lotus, Z. Spina-Christi, Z. vulgaris.

MIDLLE AND TEMPERATE EASTERN ASIA.

Acer palmatum, A. pictum, Agaricus flammeus, Agriophyllum Gobicum, Agrostis vulgaris, Ailantus glandulosa, Albizzia Julibrissin, Allium fistulosum, Alopecurus geniculatus, Aralia cordata, Arenga saccharifera (under Zalacca), Aristolochia recurvilabra, Artemisia Cina, A. Dracunculus, Arundinaria Japonica (under Schizostachyum), Atriplex hortensis, Avena elatior, A. fatua, A. flavescens, A. pubescens, Balsamodendron Mukul, Bambusa Beechyana, B. flexuosa, B. tultoides (under Schizostachyum), Barbaræa vulgaris, Basella rubra, Betula alba, Bœhmeria nivea, Brassica alba, B. Chinensis, B. juncea, B. nigra, Bromus asper, Broussonetia papyrifera, Buxus microphylla, Cæsalpinia sepiaria, Camellia Thea, Cannabis sativa, Caragana arborescens, Carpinus cordata, C. erosa, C. Japonica, C. laxiflora, Carum Bulbocastanum, C. Carui, Cedrela sinensis, Cephalotaxus Fortunei, Chamærops excelsa, Chenopodum Bonus Henrickus, C. Fortunei, Cinnamomum Camphora, Citrus Japonica, Corchorus capsularis, Cordyline Ti, Corylus heterophylla, Cryptomeria Japonica, Cucumis Conomon, Cupressus obtusa, C. pisifera, Cycas revoluta, Daucus Carota, Debregeasia edulis, Dendrocalamus strictus, Dioscorea Japonica, D. oppositifolia, D. quinqueloba, D. sativa, Diospyros Kaki, D. Lotus, Ehrharta caudata, Elæagnus parvifolius, Eleusine Coracana, Excæcaria sebifera, Euryale ferox, Euryangium Sumbul, Fagopyrum cymosum, F. emarginatum, F. esculentum, F. Tataricum, Fagus Sieboldii, Fasia papyrifera, Flueggea Japonica, Fraxinus Chinensis, Geum urbanum, Ginkgo biloba, Gleditschia horrida, Glycine hispida, G. Soya, Heleocharis tuberosa, Heracleum Sibiricum, Hovenia dulcis, Hydrangea Thunbergi, Illicium anisatum, Imperata arundinacea, Isatis indigotica, I. tinctoria, Jasminum grandiflorum, J. officinale, J. Sambac, Juglans cordiformis, J. Mandschurica, J. Sieboldiana, J. stenocarpa, Juniperus Chinensis, J. sphærica, Lathyrus macrorrhizus, Lepidum latifolium, Lespedeza striata, Ligustrum Japonicum. Ligindambar Formosana, Livistona Chinensis, Magnolia hypoleuca, M. Yulan, Melica altissima, Morus alba, Mucuna Cochinchinensis, Musa Cavendishii, Myrtus tomentosa, Nageia cupressina, Nephelium Litchi, N. Longânum, Osmanthus fragrans, Pachyma Hœlen, Paliurus ramosissimus, Pawlownia imperialis, Pennisetum cereale, Perilla arguta, Phœnix pusilla, Photina Eryobotrya, Phyllostachys bambusoides, P. nigra (under Schizostachyum), Physalis Alkekengi, P. angulata, Pinus Alcoquiana, P. densiflora, P. firma, P. Fortunei, P. Jezoensis, P. Kæmpferi, P. Koraiensis, P. leptolepis, P. Massoniana, P. parviflora, P. polita, P. Sibirica, P. stenolepis, P. Tsuga, Planera Japonica, Poa airoides, P. Alpina, P. fertilis, Polygaster Sampadarius, Polygonum tinctorium, Populus nigra, P. tremula, Prangos pabularia, Pterocarpus Indicus, Pterocarya fraxinifolia, P. stenaptera, Pugionium cornutum, Pyrus Japonica, Quercus Chinensis, Q. cornea, Q. cuspidata, Q. dentata, Q. glabra, Q. glauca, Q. Mongolica, Q. serrata, Rhamnus chlorophorus, R. utilis, Rhapis flabelliformis, R. humilis, Rheum officinale, R. palmatum, R. Rhaponticum, R. Tartaricum, R. undulatum, Rhus semialata, R. succedanea, R. vernicifera, Rosa Indica, R. lævigata, R. moschata, R. sempervirens, R. spinosissima, Rubia cordifolia, Rubus parvifolius, Rumex acetosa, R. Patientia, Saccharum officinarum, S. Sinense, Sagittaria sagittifolia, Salix Babylonica, Sanguisorba minor, Sciadopitys verticillata, Scorzonera albicaulis, Selinum Monnieri, Sophora Japonica, Spergula arvensis, Spinacia oleracea, Sterculia monosperma, Tetragonia expansa, Tetranthera Japonica, Tilia Europæa, T. Manchurica, Thuyopsis dolabrata, Torreya grandis, T. nucifera, Trapa bicornis, T. bispinosa, Trifolium pratense, Triphasia Aurantiola, Ulmus campestris, U. parvifolia, Vaccinium præstans, Veratrum album, Vicia Cracca, V. sepium, V. sylvatica, Vigna Sinensis, Vitis Labrusca, V. vulpina, Wistaria Chinensis, Zelkova acuminata, Zizania latifolia, Zizyphus Jujuba, Z. sinensis, Zoysia pungens.

SOUTHERN ASIA.

Acacia Arabica, A. catechu, A. Concinna, A. Farnesiana, A. latronum, A. Sundra, Acer lævigatum, A. niveum, A. sterculiaceum, A. villosum, Aconitum ferox, Ægiceras majus, Æschynomene aspera, Æsculus Indica, Albizzia bigemina, A. Lebbeck, Aleurites cordata, Alnus Nepalensis, Aloe socotrina, Aloexylon Agallochum, Amaranthus paniculatus, Andropogon Calamus, A. cernuus, A. citratus, A. Ivarancusa, A. Martini, A. muricatus, A. Nardus, A. pertusus, A. saccharatus, A. Schœnanthus, A. Sorghum, A. falcatus, A. Gryllos, A. sericeus, Anthistiria ciliata, Aponogeton crispus, Aquilaria Agallocha, Areca Nagensis, A. triandra (under Zalacca), Aristolochia Indica, Artocarpus integrifolia, Arundinaria falcata, Arundo Bengalensis, A. callosa, A. debilis, A. Hookeriana, A. Khasiana, A. suberecta (under Schizostachyum), Arundo Karka, Asplenium Nidus, Averrhoa Bilimbi, A. Carambola, Avicennia officinalis, Azima tetracantha, Bambusa arundinacea, B. aspera, B. attenuata, B. Blumeana, B. elegantissima, B. flexuosa, B. monadelpha, B. spinosa, B. stricta, B. verticillata, B. vulgaris, B. Balcooa, B. Blumeana, B. Brandisii, B. marginata, B. nutans, B. pallida, B. polymorpha, B. regia, B. Tulda (under Schizostachyum), Basella lucida, B. rubra, Beesha elegantissima, B. Rheedei, B. stridula, B. Travancorica (under Schizostachyum), Benincacerifera, Bentinckia Coddapanna (under Zalacca), Berberis aristata, B. Asiatica, B. Lycium, B. Nepalensis, Betula acuminata, Boehmeria nivea, Borassus flabelliformis, Boswellia thurifera, Brassica juncea, Butea frondosa, Buxus Wallichiana, Cæsalpinia Sappan, C. sepiaria, Cajánus Indicus, Calamus montanus, C. acanthospathus, C. erectus, C. extensus, C. Flagellum, C. floribundus, C. leptospadix, C. macrospathus, C. Mishmelensis, C. quinquenervius, C. Royleanus, C. schizospathus, C. tenuis (under Zalacca), Camellia Thea, Canavalia gladiata, Capparis aphylla, C. horrida, C. Roxburghi, C. sepiaria, Carex Moorcroftiana, Carissa Carandas, Carpinus viminea, Carthamus tinctorius, Carum Ajawan, C. gracile, C. nigrum, Caryota obtusa (under Zalacca), C. urens, Cassia fistula, Castanopsis argentea, C. Indica, Casuarina equisetifolia, Cephalostachyum capitatum, C. pallidum, C. pergracile (under Schizostachyum), Chamærops Khasyana, C. Martiana, C. Richicana, Chloroxylon Swietenia, Chrysanthemum roseum, Cinnamomum Cassia, Citrus Aurantium, C. medica, Colocasia antiquorum, C. Indica, Corchorus acutangulus, C. capsularis, C. olitorius, Crambe cordifolia, Crotalaria Burhia, C. juncea, C. retusa, Croton lacciferus, Cucumis cicatricatus, C. Colocynthis, C. momordica, C utilissimus, Cupressus torulosa, Cyamopsis psoraloides, Cynodon Dactylon, Cyperus corymbosus, C. tegetum, Dæmonorops Guruba, D. Jenkinsii, D. nutentiflorus (under Zalacca), Dalbergia Sissoo, Dammara alba, Debregeasia dichotoma, D. hypoleuca, D. velutina, D. Wallichiana, Dendrocalamus flagellifer, D. giganteus, D. Hamiltoni, D. Hookeri, D. sericeus, D. strictus (under Schizostachyum), Desmodium triflorum, Dioscorea aculeata, D. alata, D. deltoidea, D. glabra, D. globosa, D. nummularia, D. oppositifolia, D. pentaphylla, D. purpurea, D. sativa, D. spicata, D. tomentosa, D. triphylla, Diospyros chloroxylon, D. Ebenum, D. melanoxylon, D. oppositifolia, D. quæsita, Dolichos uniflorus, Eleusine Coracana, E. stricta, Engelhardtia spicata, Eriochloa annulata, Eugenia cordifolia, E. Jambos, E. nitaboides, E. Malaccensis, E. revoluta, E. rotundifolia, Euryale ferox, Fagopyrum cymosum, F. emarginatum, F. rotundatum, F. triangulare, Ficus elastica, F. Indica, F. infectoria, F. laccifera, Flacourtia cataphracta, F. Ramontchi, Flemingia tuberosa, Fraxinus floribunda, Garcinia Travancorica, Gigantochloa apus, G. aspera, G. atter, G. heterostachya, G. maxima (under Schizostachyum), G. nigrociliata, G. verticillata, G. robusta, Glycine hispida, Gossypium arboreum, G. herbaceum, Guizotia oleifera, Gunnera macrophylla, Hardwickia binata, Harina caryotoides, Heleocharis fistulosa, H. plantaginea, Hemarthria compressa, Hibiscus cannabinus, H. Sabdariffa, Holoptolea integrifolia, Hydnum coralloides, Indigofera argentea, I. tinctoria, Ipomœa mammosa, I. paniculata, Isonandra gutta, Jasminum grandiflorum, J. Sambac, Juniperus recurva, J. Wallichiana, Justicia Adhatoda, Kentia Moluccana, Lactuca sativa, Lagerstromia Indica, Lawsonia alba, Licuala peltata (under Zalacca), Limonia acidissima, Liquidambar Altingia, Livistona Jenkinsii (under Zalacca), Maba Ebenus, Magnolia Campbelli, M. sphærocarpa, Mallotus Philippinensis, Malvastrum spicatum, Mangifera Indica, Maoutia Puya, Melaleuca Leucadendron, Melia Azedarach,

Meloccanna bambusoides, M. humilis, Mimosa rubicaulis, Moringa pterygosperma, Morus atropurpurea, Mucuna Cochinchinensis, Musa Coccinea, M. corniculata, M. paradisiaca, M. sapientum, M. simiarum, M. troglodytarum, Myrica sapida, Myrtus tomentosa, Nageia amara, N. bracteata, N. cupressina, Nardostachys grandiflora, N. Jatamansi, Nastus Borbonicus (under Schizostachyum), Nephelium lappaceum, N. Longanum, Nyctanthes Arbortristis, Ocimum Basilicum, O. canum, O. gratissimum, O. sanctum, Oncospermum fasciculatum, Oryza sativa, Oxytenanthera albo-ciliata, O. nigrociliata, O. Thwaitesii (under Schizostachyum), Onosma Emodi, Pandanus furcatus, Panicum coloratum, P. compositum, P. flavidum, P. foliosum, P. molle, P. Myurus, P. semialatum, P. tenuiflorum, P. brizanthum, P. fluitans, P. frumentaceum, P. Italicum, P. Koenigii, P. miliaceum, P. prostatum, P. repens, P. sarmentosum, P. virgatum, Parrotia Jacquemontiana, Paspalum distichum, P. scrobiculatum, Pennisetum thyphoideum, Perilla ocimoides, Peucedanum Sowa, Phaseolus aconitifolius, P. adenanthus, P. lunatus, P. Max, P. vulgaris, Phœnix humilis, P. Ouseloyana (under Zalacca), P. paludosa, P. pusilla, P. sylvestris, Phyllostachys bambusoides (under Schizostachyum), Pinus Brunoniana, P. Cedrus, P. excelsa, P. Gerardiana, P. Griffithii, P. longifolia, P. Pindrow, P. Smithiana, P. Webbiana, Pipturus propinquus, P. velutinus, Plectocomia Assamica (under Zalacca), P. Himalayana, P. Khasyana (under Zalacca), P. macrostachya, Poa Chinensis, P. parviflora, P. cynosuroides, Podophyllum Emodi, Pogostemon Heyneanus, P. parviflorus, P. Patchouli, Polygala crotalaroides, Polygaster sampadarius, Populus ciliata, P. Euphratica, Pouzolzia tuberosa, Prosopis specifera, Pseudostachyum polymorphum (under Schizostachyum), P. gracilis (under Zalacca), Pterocarpus Indicus, P. Marsupium, P. santalinus, Ptychosperma disticha, P. Muschenbrockiana, Pueraria tuberosa, Pyrularia edulis, Quercus annulata, Q. dilatata, Q. incana, Q. lancifolia, Q. semicarpifolia, Q. squamata, Q. Sundaica, Raphanus caudatus, R. sativus, Remirea maritima, Rheum Australe, R. officinale, Rhododendron Falconeri, Rhus vernicifera, Ribes glaciale, R. Griffithii, R. laciniatum, R. villosum, Ricinus communis, Rosa Indica, R. moschata, R. sempervirens, Rubia cordifolia, Rubus lasiocarpus, R. rugosus, Saccharum officinarum, S. spontaneum, S. violaceum, Salix tetrasperma, Sanseviera Zeylanica, Santalum album, Schizostachyum Blumei, S. brachycladum, S. Hasskarlianum, S. irratum, S. Zollingeri, Scutia Indica, Sesamum Indicum, Sesbania aculeata, S. Ægyptiaca, S. cannabina, Sesuvium Portulacastrum, Shorea robusta, S. Talura, Solanum album, S. ferox, S. Guineense, S. insanum, S. longum, S. melongena, S. pseudo-saponaceum, S. undulatum, S. xanthocarpum, Spinifex squarrosus, Stenotaphrum Americanum, Stercula monosperma, S. urceolata, S. urens, Streblus asper, Swertia chirata, S. elegans, Symplocos ramosissima, Tamarindus Indica, Tamarix articulata, T. dioica, T. Gallica, Tectona grandis, Temostachyum attenuatum, T. Griffithii (under Schizostachyum), Terminalia Catappa, T. Chebula, T. parviflora, Tetranthera calophylla, T. laurifolia, Thamnocalamus Falconeri, T. spathiflorus (under Schizostachyum), Thouarea sarmentosa, Trapa bispinosa, T. Cochinchinensis, T. incisa, T. quadrispinosa, Trichodesma Zeylanicum, Triphasia Aurantiola, Ulmus Wallichiana, Urena lobata, Vaccinium Leschenaulti, Vigna Sinensis, Villabrunea frutescens, V. integrifolia, Vitis auriculata, V. Blumeana, V. elongata, V. Imperialis, V. Indica, V. Labrusca, V. lævigata, V. mutabilis, V. quadrangularis, V. thyrsiflora, V. vulpina, Wallichia caryotoides, Wallichia densiflora, Ximenia Americana, Zalacca secunda, Zingiber officinale, Zizyphus Jujuba, Z. rugosa, Zoysia pungens.

WESTERN SOUTH AMERICA.

Acacia Cavenia, A. macracantha, Adenostemum nitidum, Adesmia balsamica, Alchemilla pinnata, Alstroemeria pallida, Andropogon argenteus, Anona Cherimolia, Apium prostratum, Arachis hypogæa, Araucaria imbricata, Aristotelia Macqui, Arracacha xanthorriza, Berberis buxifolia, B. Darwinii, Boussingaultia baseltoides, Cæsalpinia brevifolia, C. tinctoria, Canna edulis, Ceroxylon andicola, C. Australe, Cereus Quisco, Ceroxylon Australe, C. pithyrophyllum (under Wettinia), Cervantesia tomentosa, Chenopodium Quinoa, Chusquea Culoon, C. Dombeyana, C. montana, C. Quila, C. tenuiflora (under Schizostachyum), Cinchona Calisaya, C. cordifolia; C. micrantha, C. nitida, C. officinalis, C. succirubra, Condalia microphylla,

Dactylis cæspitosa, Datura arborea, Dioscorea piperifolia, Diplothemium Porallyi (under Wettinia), Diposis Bulbocastanum, Drimys Winteri, Elymus condensatus, Embothrium coccineum, E. emarginatum, E. lanceolatum, Erythroxylon Coca, Eucryphia cordifolia, Eugenia Hallii, Euterpe Andicola, E. Hænkena, E. longivaginata (under Wettinia), Fagus Dombeyi, F. obliqua, F. procera, Festuca Coiron, Fitzroya Patagonica, Fragaria Chiloensis, Geonoma densa (under Wettinia), Gossypium religiosum, Guadua angustifolia, G. latifolia, Guevina Avellana, Gunnera Chilensis, Helianthus annuus, H. tuberosus, Heliotropium Peruvianum, Hibiscus esculentus, Hypochoeris apargioides, H. Scorzoneræ, Ipomœa Batatas, Jubæa spectabilis, Krameria triandra, Lapageria rosea, Lardizabala biternata, Laurelia aromatica, L. serrata, Libocedrus Chilensis, L. tetragona, Lippia citriodora, Manihot Aipi, Maranta arundinacea, Mauritia flexuosa, Maytenus Boaria, Melicocca bijuga, Morus celtidifolia, M. insignis, Myrtus Luma, M. Meli, M. nummularia, M. Ugni, Nageia Andina, N. Chilina, N. nubigena, Opuntia vulgaris, Oreodoxa frigida (under Wettinia), Oryza latifolia, Oxalis crassicaulis, O. crenata, O. enneaphylla, O. succulenta, O. tuberosa, Pacchyrrhizus angulatus, Panicum pilosum, Paspalum ciliatum, P. dilatatum, Passiflora alata, P. ligularis, P. macrocarpa, Persea gratissima, Peumus Boldus, Physalis Peruviana, Phytelephas æquatorialis (under Wettinia), Piptadenia rigida, Prosopis horrida, P. juliflora, P. Siliquastrum, Priva lævis, Quillaja saponaria Rhus caustica, Rubus geoids, Salix Humboldtiana, Saxona-Gothæa conspicua, Schkuhria abrotanoides, Sesuvium Portulacastrum, Smilax officinalis, Solanum Gilo, S. Gianense, S. liquopersicum, S. muricatum, S. Quitoense, S. tuberosum, S. torvum, Sophora tetraptera, Spilanthes oleracea, Tagetes glanduligera, Tetragonia expansa, Tillandsia usneoides, Trithrinax campestris, Tropæolum majus, T. minus, T. sessilifolium, T. tuberosum, Ullucus tuberosus, Vaccinium alatum, V. bicolor, V. grandiflorum, V. melliflorum, Wettinia augusta, W. Maynensis, Witheringia solanacea, Zea Mays, Zizyphus Ioazeiro, Z. Mistal.

WESTERN NORTH AMERICA.

Acer macrophyllum, Arbutus Menziesii, Baccharis consanguinea, B. pilularis, Barbaræa vulgaris, Bouteloua barbata, Carum Gairdneri, Castanopsis chrysophylla, Ceanothus prostratus, C. rigidus, C. thyrsiflorus, Cercocarpus ledifolius, C. parvifolius, Cereus Engelmanni, Chlorogalum pomeridianum, Cupressus Lawsoniana, C. macrocarpa, C. Nutkaensis, Cymopterus glomeratus, Fraxinus Oregana, Gaultiera Thyrsinites, Geum urbanum, Juglans rupestris, Juniperus occidentalis, Libocedrus decurrens, Lupinus Douglasii, Myrrhis occidentalis, Nicotiana multivalvis, Nuphar multisepalum, Nyssa aquatica, Parkinsonia aculeata, P. microphylla, Pinus amabilis, P. bracteata, P. concolor, P. edulis, P. Nuttallii, P. Williamsonii, P. contorta, P. Coulteri, P. Douglasii, P. grandis, P. Lambertiana, P. Menziesii, P. Mertensiana, P. monophylla, P. monticola, P. muricata, P. nobilis, P. Pattoniana, P. ponderosa, P. radiata, P. Sabiniana, Platanus racemosa, Populus tremuloides, P. trichocarpa, Pritchardia filamentosa, Prosopis pubescens, Prunus ilicifolia, Quercus agrifolia, Q. chrysolepis, Q. densiflora, Q. Douglasii, Q. Garryana, Q. lobata, Ribes aureum, R. divaricatum, R. niveum, R. tenuiflorum, R. villosum, Rubus macropetalus, Scilla esculenta, Sequoia sempervirens, S. Wellingtonia, Solanum Fendleri, S. tuberosum, Tetranthera Californica, Torreya Californica, Vaccinium humifusum, V. ovalifolium, V. ovatum, Valeriana edulis, Yucca brevifolia, Y. Treculiana, Y. Sitchensis.

EASTERN NORTH AMERICA.

Acer dasycarpum, A. Negundo, A. rubrum, A. saccharinum, Achillea millefolium, Achras Sapota, Acorus Calamus, Acrocomia Mexicana, Actæa alba, Æsculus flava, Agave Americana, A. Mexicana, Agrostis alba, A. rubra, A. scabra, A. vulgaris, Alchemilla Alpina, A. vulgaris, Aletris farinosa, Allium Canadense, A. Schœnoprasum, Amelanchier Botryapium, Andropogon nutans, Apios tuberosa, Apocynum cannabinum, Arctostaphylos uva-ursi, Aristolochia anguicida, A. ovalifolia, A. serpentaria, Arundinaria macrosperma, Aspidosperma Quebracho, Astragalus hypoglottis, Barbaræa vulgaris, Betula lenta, B. lutea, B. nigra, B. papyracea, Bouteloua barbata,

Buchloa dactyloides, Cakile maritima, Calamagrostis longifolia, Canna flaccida, Carya alba, C. amara, C. glabra, C. microcarpa, C. oliviformis, C. sulcata, C. tomentosa, Cassia Marylandica, Catalpa bignonioides, Cedronella cordata, Celtis occidentalis, Chamædora concolor, Cimifuga racemosa, Cinna arundinacea, Cladastris tinctoria, Cochlearia officinalis, Cratægus æstivalis, C. apiifolia, C. coccinea, C. cordata, C. Crus-Galli, C. parvifolia, C. tomentosa, Cupressus Benthami, C. Lindleyi, C. thurifera, C. thuyoides, Diospyros Virginiana, Dirca palustris, Elymus mollis, Fagus ferruginea, Festuca flava, F. purpurea, Fragaria Chiloensis, F. grandiflora, F. Illinoensis, F. vesca, F. Virginiana, Fraxinus Americana, F. platycarpa, F. pubescens, F. quadrangulata, F. sambucifolia, F. viridis, Gaultieria Shallon, Gaylussacia frondosa, G. resinosa, Gelsemium nitidum, Geum urbanum Gleditschia monosperma, G. triacanthos, Gordonia lasianthos, Guilandina Bonduc, Gymnocladus Canadensis, Hedeoma pulegioides, Hordeum nodosum, Humulus Lupulus, Hydrastis Canadensis, Ilex Cassine, Indigofera Anil, Ipomœa Megapotamica, I. platanifolia, I. simulans, Juglans cinerea, J. nigra, Juniperus flaccida, J. Mexicana, J. Virginiana, Levisia rediviva, Liatris odoratissima, Lindera Benzoin, Liquidambar styraciflua, Liriodendron tulipifera, Lithospermum canescens, L. hirtum, L. longiflorum, Lupinus perennis, Lycopodium lucidulum, Maclura aurantiaca, Magnolia acuminata, M. cordata, M. Fraseri, M. grandiflora, M. macrophylla, M. umbrella, Melica mutica, Menyanthes trifoliata, Milium effusum, Monarda didyma, M. fistulosa, M. punctata, Morchella esculenta, Morus rubra, Myrica cerifera, Nelumbo lutea, Nicotiana quadrivalvis, N. repanda, N. rustica. N. Tabacum, Nyssa aquatica, N. multiflora, N. uniflora, Opuntia coccinellifera, O. Ficus-Indica, O. Hernandezii, O. Missouriensis, O. Rafinesquii, O. spinosissima, O. Tuna, O. vulgaris, Oryza latifolia, O. perennis, Ostrya Virginica, Oxalis Deppei, O. esculenta, O. tetraphylla, O. violacea, Pachyma Cocos, Panicum amarum, P. virgatum, Parkinsonia aculeata, Parthenium integrifolium, Passiflora incarnata, P. lutea, P. suberosa, Peireskia aculeata, P. Bleo, P. portulacifolia, Phaseolus perennis, Physalis angulata, Pinus alba, P. Australis, P. Ayacohuite, P. balsamea, P. Canadensis, P. cembroides, P. Fraseri, P. glabra, P. Hartwegii, P. Hudsonica, P. leiophylla, P. mitis, P. Montezumæ, P. nigra, P. patula, P. pendula, P. Pinceana, P. pseudo-strobus, Pinus pungens, P. religiosa, P. rigida, P. rubra, P. serotina, P. Strobus, P. Tæda, P. tenuifolia, P. Teocote, Pisonia aculeata, Planera aquatica, Platanus occidentalis, Poa airoides, P. Alpina, P. angustifolia, P. aquatica, P. Canadensis, P. distans, P. fertilis, P. fluitans, P. maritima, P. nemoralis, Podophyllum peltatum, Polygala Senega, Populus angustifolia, P. Canadensis, P. balsamifera, P. grandidentata, P. heterophylla, P. monilifera, P. tremuloides, Prosopis dulcis, P. glandulosa, P. juliflora, P. pubescens, Prunus Americana, P. Caroliniana, P. Chisasa, P. maritima, P. Pennsylvanica, P. pumila, P. serotina, P. Virginiana, Psamma arenaria, Psoralea esculenta, Pycnanthemum incanum, P. montanum, Pyrularia edulis, Pyrus coronaria, Quercus acutifolia, Q. alba, Q. aquatica, Q. chrysophylla, Q. coccinea, Q. falcata, Q. glaucescens, Q. lanceolata, Q. laurina, Q. lyrata, Q. macrocarpa, Q. obtusata, Q. obtusiloba, Q. palustris, Q. Phellos, Q. Prinus, Q. reticulata, Q. rubra, Q. sideroxylon, Q. stellata, Q. virens, Q. Xalapensis, Rhododendron maximum, Rhus copallina, R. glabra, R. typhina, Ribes aureum, R. cynosbati, R. floridum, R. hirtellum, R. Hudsonianum, R. nigrum, R. rotundifolium, R. rubrum, Robina pseudo-acacia, Rosa setigera, Rubus Arcticus, R. Canadensis, R. Chamæmorus, R. cuneifolius, R. deliciosus, R. occidentalis, R. odoratus, R. strigosus, R. trivialis, R. villosus, Rumex acetosa, Sabal Adansoni, S. Palmetto, S. serrulata, Sagittatia lancifolia, S. obtusa, Salix cordata, S. longifolia, S. lucida, Sabbatia angularis, S. nigra, S. petiolaris, S. tristis, Sambucus Canadensis, Sanguinaria Canadensis, Sassafras officinale, Schoenocaulon officinale, Shepherdia argentea, Smilax medica, S. rotundifolia, Solanum calycinum, S. Fendleri, S. tuberosum, Spartina cynosuroides, S. juncea, S. polystachya, Spartina stricta, Spigelia Marylandica, Stenotaphrum Americanum, Tanacetum vulgare, Taraxacum officinale, Taxodium distichum, T. mucronatum, Taxus brevifolia, Thuya gigantea, T. occidentalis, Tilia Americana, T. heterophylla, Tillandsia usneoides, Torreya taxifolia, Trifolium reflexum, T. repens, Tripsacum dactyloides, Ulmus alata, U. Americana, U. crassifolia, U. fulva, U. Mexicana, U. racemosa, Uniola paniculata, Uvularia sessilifolia, Vaccinium cæspitosum, V. corymbosum, V. erythrocarpum, V. leucanthum, V. macrocarpum, V. myrtilloides,

V. Myrtillus, V. ovalifolium, V. ovatum, V. oxycoccus, V. parvifolium, V. Pennsylvanicum, V. uliginosum, V. vacillans, V. Vitis-Idæa, Valeriana edulis, Veratrum viride, Vicia Cracca, Vitis æstivalis, V. Labrusca, V. vulpina, Xanthorrhiza apiifolia, Ximenia Americana, Yucca aloifolia, Y. filamentosa, Y. gloriosa, Zizania aquatica, Z. miliacea.

CENTRAL AMERICA.

Acacia macracantha, Achras Sapota, Acrocoma Mexicana, Agave Americana, A. rigida, Albizzia dulcis, A. latisiliqua, A. Saman, Amarantus penniculatus, Anona muricata, A. squamosa, Arracacha xanthorrhiza, Arthrostylidium excelsum, A. longiflorum, A. racemiferum (under Schizostachyum), Arundinaria acuminata, Aulonemia Quexo (under Schizostachyum), Bactris Gasipaes, Batis maritima, Bouteloua barbata, Brahea dulcis, Bursera elemifera, Buxus acuminata, B. citrifolia, B. Cubana, B. glomerata, B. gonoclada, B. lævigata, B. Purdieana, B. retusa, B. subcolumellaris, B. Vahlii, B. Wrightii, Cæsalpinia crista, C. vesicaria, Cakile maritima, Canavalia gladiata, Canna coccinea, C. glauca, Carludovica palmata (under Wettinia), Casimiroa edulis, Celtis Tala, Ceroxylon Andicola, C. Klopstockia (under Wettinia), Chusquea abietifolia, C. Fendleri, C. Galeottiana, Chusquea Muelleri, C. scandens, O. simpliciflora, C. uniflora (under Schizostachyum), Coccoloba unifera, Cocos regia, Copernicia nana, C. Pumos, Cyperus giganteus, Dioscorea Cajennensis, D. esurientum, D. trifida, Eriochloa annulata, Euchlaena luxurians, Eupatorium triplinerve, Fourcroya Cubensis, F. gigantea, F. longæva, Geonoma undata, G. vaga, Gossypium Barbadense, G. hirsutum, G. religiosum, Hibiscus esculentus, Hyospathe pubigera, Indigofera Anil, Ipomœa Batatilla, Juniperus Bermudiana, Kunthia montana, Malvastrum spicatum, Maranta arundinacea, Melicocca bijuga, Morus celtidifolia, Nageia coriacea, N. Purdieana, Opuntia coccinellifera, O. Dillenii, O. elatior, O. Hernandezii, O. spinosissima, O. Tuna, Oreodoxa frigida, O. regia, Pachyrrhizus angulatus, Panicum altissimum, P. divaricatum, P. molle, P. Myurus, P. obtusum, Paspalum stoloniferum, Passiflora laurifolia, P. ligularis, P. maliformis, P. serrata, Peireskia aculeata, Persea gratissima, Platenia Chiragua (under Wettinia), Podachænium alatum, Polianthes tuberosa, Psidium acidum, P. Araca, P. cordatum, P. Guayava, P. polycarpum, Quercus agrifolia, Q. Castanea, Q. Skinneri, Remirea maritima, Sabal umbraculifera, Sechium edule, Sesuvium Portulacastrum, Smilax officinalis, S. papyracea Solanum Cetaceum, S. Guineense, S. Plumieri, S. Topiro, S. torvum, Swietenia Mahagoni, Talinum patens, Thrinax argentea, T. parviflora, Terminalia buceras, Tillandsia usneoides, Trophis Americana, Urena lobata, Vaccinium meridionale, V. Mortinia, Zezania miliacea.

EASTERN SOUTH AMERICA.

Acacia Cebil, A. macracantha, Acrocomia Totai (under Wettinia), Alibertia edulis, Amyris terebinthifolia, Apium prostratum, Araucaria Brasiliensis, Arundinaria verticillata (under Schizostachyum), Arundo saccharoides, A. Sellowiana, Aspidosperma Guebracho, Boussingaultia baselloides, Bromus unioloides, Cæsalpinia coriaria, C. echinata, C. Gilliesii, Calyptranthes aromatica, Canna Achiras, Capsicum annuum, C. baccatum, C. frutescens, C. longum, C. microcarpum, Cedrela Brasiliensis, Celtis Tala, Cephaelis Ipecacuanha, Ceroxylon Klopstockia, Chenopodium ambrosioides, Chusquea capituliflona, C. Lozenziaza, C. Gaudichaudiana (under Schizostachyum), Cocos Australis, C. flexuosa, C. Romanzoffiana, C. Yutay, C. Zantai (under Wettinia), Copernicia cerifera, Condalia microphylla, Cyperus giganteus, Dactylis cæspitosa, Dalbergia nigra, Desmodium triflorum, Dioscorea conferta, D. tuberosa, Diplothemium littorale (under Wettinia), Duvana longifolia, Eugenia Nhanica, E. pyriformis, E. supra-axillaris, E. uniflora, Geonoma vaga, Gourliaca decorticans, Guadua angustifolia, G. capitata, G. latifolia, G. macrostachya, G. paniculata, G. refracta, G. Tagoara, G. virgata, Heterothalamus brunioides, Hymenæa Courbaril, Iacaranda mimosifolia, Ilex Paraguensis, Indigofera Anil, Ipomœa Batatas, I. Batatilla, I. Megapotamica, I. operculata, I. paniculata, Iriartea deltoidea, I. exorrhiza, I. ventricosa (under Wettinia), Lippia citriodora, Lupinus arboreus, Macluron Mora, Malvastrum spicatum, Manihot Aipi, M. utilissima,

Maliera glomerata, M tomentosa, Merostachys Claussenii, M. Cunthii, M. ternata (under Schizostachyum), Myrtus edulis, Nageia Lamberti, Nicotiana rustica, N. Tabacum, Ocimum gratissimum, Œnocarpus multicaulis (under Wettinia), Opuntia vulgaris, Oryza latifolia, Oxalis carnosa, O. conorrhiza, Pachyrrhizus angulatus, Panicum altissimum, P. barbinode, P. Chyurus P. divaricatum P. molle, P. latissimmum, P. palosum, Parkinsonia aculeata, Paspalum notatum, P. ciliatum, P. dilatatum, Passiflora alata, P. coccinea, P. cœrulea, P. edulis, P. filamentosa, P. laurifolia, P. maliformis, P. quadrangularis, P. serrata, P. suberosa, Peireskia aculeata, P. Bleo, P. portulacifolia, Peltophorum Linnare, Periandra dulcis, Persea gratissima, Phaseolus adenanthus, P. lunatus, Phytelephas macrocarpa, P. microcarpa (under, Wettinia), Pilocarpus pinnatifolius, Piptadenia rigida Prosopis dulcis, P. Siliquastrum, Psidium Araca, P. arboreum, P. Cattleyanum, P. chrysophyllum, P. cinereum, P. cuneatum, P. grandifoliumu, P. Guayava, P. incanescens, P. lineatifolium, P. malifolium, P. polycarpon, P. rufum, Rubus imperialis, Salix Humboldtiana, Salpichroma rhomboidea, Salvia matico, Sesuvium portulacastrum, Smilax papyracea, Solanum Gilo, S. Guineense, S. indigoferum, S. Lycopersicum, S. torvum, S. tuberosum, Spilanthes oleracea, Sporobolus Indicus, Syagrus Sancona, Sterculia Carthaginensis, Tagetes glanduligera, Talinum patens, Tillandsia usneoides, Terminalia Buceras, Trithrynax Brasiliana (under Wettinia), T. Brasiliensis, Trophis Americana, Ullucus tuberosus, Zea Mays, Zizania microstachya, Zizyphus mistal.

MIDDLE AFRICA (AND MADAGASCAR).

Acanthosycios horrida, Aristida prodigiosa, Asplenium Nidus, Astragalus venosus, Beesha capitata, Buddleya Madagascariensis, Buxus Madagascarica, Canavalia gladiata, Casuarina equisetifolia, Coffea Liberica, Corchorus acutangulus, Eriachloa annulata, Hagenia Abyssinica, Hibiscus Sabdariffa, Hyphæne Thebaica, Maclura excelsa, Malvastrum spicatum, Monadora Angolensis, M. myristica, Panicum coloratum, P. compositum, P. fluitans, P. molle, Pharmaceum acidum, Phœnix spinosa, Pterolobium lacerans, Remirea maritima, Rubus rosifolius, Solanum edule, S. Thonningi, Telfairia occidentalis, T. pedata, Trichodesma Zeylanicus, Urena lobata, Vahea florida, V. Owariensis, Vigna Sinensis, Vitis Schimperiana.

SOUTHERN AFRICA.

Aberia Caffra, A. tristis, A. Zeyheri, Acacia Giraffæ, A. horrida, Alchemilla Bapensis, A. elongata, Aloe dichotoma, A. ferox, A. linguiformis, A. plicatilis, A. purpurascens, A. spicata, A. Zeyheri, Andropogon Caffrorum, Anthistiria ciliata, Aponogeton distachyon, Arundinaria tesselata, Asparagus laricinus, Azima tetracantha Barosma serratifolia, Cannamois cephalotes, Carissa Arduina, C. ferox, C. grandiflora, Carum Capense, Combretum butyraceum, Elegia nuda, Euclea myrtina, E. undulata, Eugenia Zeyheri, Garuleum bipinnatum, Gladiolus edulis, Gonioma Kamassi, Hemarthria compressa, Hibiscus Ludwigii, Hyphæne ventricosa, Leucadendron argenteum, Leyssera gnaphalioides, Lyperia crocea, Matricaria glabrata, Melianthus major, Mesembrianthemum acinaciforme, M. capitatum, M. crystallinum, M. edule, Myrica cordifolia, M. quercifolia, M. serrata, Nageia elongata, N. Thunbergi, Osmitopsis asteriscoides, Panicum coloratum, P. compositum, Pappea Capensis, Parkinsonia Africana, Pentzia virgata, Phœnix reclinata, Plectronia ciliata, P. spinosa, P. ventosa, Portulacaria Afra, Psychotria Eckloniana, Rafnia amplexicaulis, R. perfoliata, Rhus lucida, Royenia pseudebenus, R. pubescens, Rubus fruticosus, Salix Capensis, Selinum anesorrhizum, S. montanum, Tarchonanthus camphoratus, Todea Africana, Tricholæna rosea, Voandzeia subterranea, Vanguaria infausta, Widdringtonia juniperoides.

WESTERN AUSTRALIA.

Acacia acuminata, A. armata, A. microbotrya, A. saligna, Albizzia lophantha, Boronia megastigma, Casuarina Decaisneana, C. distyla, C. Fraseriana, C. Huegeliana, C. trichodon, Conospermum Stoechadis, Danthonia bipartita, Dioscorea hasti-

folia, Duboisia Hopwoodii, Encephalartos Preissii, Erianthus fulvus, Eucalyptus calophylla, E. cornuta, E. diversicolor, E. doratoxylon, E. ficifolia, E. gomphocephala, E. loxophleba, E. marginata, E. okosa, E. redunca, E. rudis, E. salmonophloia, E. salubris, Grevillea annulifera, Helichrysum lucidum, H. Manglesii, Jacksonia cupulifera, Kochia villosa, Lepidosperma gladiatum, Oryza sativa, Livistona Mariæ, Panicum flavidum, P. semialatum, Phaseolus vulgaris, Pimelea clavata, Santalum cygnorum, S. Preissianum, Sesbania Ægyptiaca, Spinifex hirsutus, S. longifolius, Strychnos Nux-Vomica, Tamarindus Indica.

EASTERN AUSTRALIA (INCLUDING TASMANIA).

Acacia armata, A. decurrens, A. falcata, A. Farnesiana, A. fasciculifera, A. glaucescens, A. harpophylla, A. homalophylla, A. implexa, A. penninervis, A. Retinodes, A. longifolia, A. melanoxylon, A. pendula, A. pycnantha, A. salicina, A. stenophylla. Ægiceras majus, Agrostis Solandri, Aira cæspitosa, Alstonia constricta, Andropogon, erianthoides, A. falcatus, A. gryllos, A. pertusus, A. refractus, A. sericeus, Angophora intermedia, A. lanolata, A. subverlutina, Anthristiria avenacea, A. ciliata, Apium prostratum, Aponogeton crispus, Araucaria Bidwilli, A. Cunninghami, Aristolochia Indica, Asplenicum Nidus, Astrebla pectinata, A. triticoides, Atalantia glauca, Atriplex halimoides, A. holocarpum, A. nummularium, Backhousia citriodora, Bacularia monostachya, Bologhia lucida, Brachychiton acerifolium, Cakile maritima, Carissa Brownii, Casuarina distyla, C. equisetifolia, C. glauca, C. quadrivalvis, C. suberosa, C. torulosa, Cedrela Toona, Chenopodium auricomum, Chloris truncata, Citrus Australasica, C. Planchoni, Colocasia Indica, Corchorus acutangulus, C. Cunninghami, C. olitorius, Crotolaria juncea, C. retusa, Cudrania Javanensis, Cycas angulata, C. Normanbyana, Cynodon Dactylon, Cyperus textilis, Dammara robusta, Danthonia bipartita, D. nervosa, D. robustas Dicksonia Billardieri, Dioscorea sativa, D. transversa, Distichlis maritima, Duboisia Hopwoodii, Ehrharta stipoides, Embothrium Wickhami, Encephalarto, Denisonii, E. spiralis, Erianthus fulvus, Eriochloa annulata, Eucalyptus acmenoides, E. Alpina, E. amygdalina, E. botryoides, E. citriodora, E. coccifera, E. coriacea, E. crebra, E. drepanophylla, E. eugenioides, E. globulus, E. goniocalyx, E. Gunnii, E. hemiphloia, E. Hilliana, E. leptophleba, E. leucóxylon, E. maculata, E. melanophloia, E. melliodora, E. microcorys, E. oleosa, E. microtheca, E. miniata, E. obliqua, E. paniculata, E. Phœnicea, E. pilularis, E. platyphylla, E. polyanthemos, E. Raveretiana, E. resinifera, E. robusta, E. rostrata, E. saligna, E. siderophloia, E. Stuartiana, E. tereticornis, E. tesselaris, E. trachyphloia, E. urnigera, E. vernicosa, E. viminalis, Eucryphia Billardieri, E. Moorei, Eugenia myrtifolia, E. Smithii, Eustrephus Brownei, Fagus Cunninghami, F. dives, F. Hookeriana, F. littoralis, F. Moorei, Ficus colossea, F. columnaris, F. Cunninghami, F. macrophylla, F. rubiginosa, Flindersia Australis, F. Bennettiana, F. Oxleyana, Frenela columellaiis, F. Macleayana, F. Parlatorei, F. verrucosa, Geitonoplesium cymosum, Geum urbanum, Grevillea robusta, Harpullia Hillii, Heleocharis sphacelata, Helichrysum lucidum, Hemarthria compressa, Hibiscus cannabinus, Hierochloa redolens, Hymenanthera Banksii, Imperata arundinacea, Ipomœa Calubra, I. paniculata, Jasminum calcareum, J. didymum, J. lineare, J. racemosum, J. simplicifolium, J. suavissimum, Kentia Belmoreana, K. Canterburyana, K. Mooreana, Kochia villosa, Lagerstroemia Indica, Leersia hexandra, Lepidosperma gladiatum, Leptospermum lævigatum, Lycopodium clavatum, L. densum, L. laterole, L. varium, Maba fasciculosa, M. geminata, Macadamia ternifolia, Mallotus Philippinensis, Malvastrum spicatum, Marlea Vitiensis, Melaleuca ericifolia, M. leucadendron, M. parviflora, M. styphelioides, M. trichostachya, Melia Azedarach, Mentha Australis, M. gracilis, M. laxiflora, M. saturejoides, Mesembrianthemum æquilaterale, Microseris Forsteri, Mylitta Australis, Myoporum insulare, Myrtus acmenoides, Nageia elata, Neuraclme Mitchelliana, Niemeyera prunifera, Ocimum sanctum, Oryza sativa, Pandanus Forsteri, P. pedunculatus, Panicum bicolor, P. chyurus, P. coloratum, P. compositum, P. divaricatissimum, P. flavidum, P. foliosum, P. marginatum, P. prolutum, P. depositum, P. Italicum, P. miliaceum, P. prostratum, P. pygmæum, P. repens, P. sanguinale, P. semialatum, P. tenuiflorum, P. virgatum, Pappophorum commune, Paspalum distichum, Phaseolus adenanthus, P. Max, Phyllocladus

rhomboidalis, Pimelea stricta, Pipturus propinquus, Pisonia aculeata, Pittosporum undulatum, Poa Australis, P. Billardieri, P. Chinensis, P. Brownii, P. digitata, Ptychosperma Alexandræ, P. Cunninghami, P. elegans, Rhagodia Billardieri, Rubus Gunnianus, R. parvifolius, R. rosifolius, Santalum Preissianum, Sclerachne cyathopoda, Sabæa albidiflora, S. ovata, Selaginella uliginosa, Sesbania aculeata, S. Ægyptiaca, Sesuvium Portulacastum, Smilax Australis, S. glycyphylla, Solanum vescum, Spinifex hirsutus, Spondias pleiogyna, Stenocarpus sinuosus, Sterculia quadrifida, Stipa artistiglumis, Syncarpia laurifolia, Synoon glandulosum, Tacca pinnatifida, Tetragonia expansa, T. implexicoma, Tetranthera laurifolia Todea Africana, Trichodesma Zeylanicum, Trigonella suavissima, Tristania conferta, Ulmus parvifolia, Vigna lanceolata, Vitis acetosa, V. Baudiniana, V. hypoglauca, Ximenia Americana, Zizyphus Jujuba, Zoysia pungens.

NEW ZEALAND.

Agrostis Solandri, Apium prostratum, Arundo conspicua, Cordyline Banksii, C. superbiens, C. indivisa, Corynocarpus lævigata, Dacrydium Colensoi, D. cupressinum, Dammara Australis, Danthonia Cunninghami, Dicksonia Billardieri, Ehrharta Diplax, E. stipoides, Fagus fusca, F. Menziesii, F. Solandri, Festuca littoralis, Fushsia excorticata, Hierochloa redolens, Hymenanthera Banksii, Kentia sapida, Knightia excelsa, Libocedrus Doniana, Metrosideros florida, M. lucida, M. robusta, M. tomentosa, Myoporum lætum, Nageia dacrydioides, N. ferruginea, N. spicata, N. Totara, Phormium tenax, Phyllocladus trichomanoides, Pittosporum eugenioides, P. tenuifolium, Ripogonum scandens, Sebæa ovata, Tetragonia expansa, T. implexicoma.

POLYNESIA.

Ægiceras majus, Andropogon refractus, Araucaria Cookii, A. excelsa, A. Rulei, Aristolochia Indica, Astocarpus incisa, Arplenium Nidus, Bacularia Arfakiana, Batis maritima, Broussonetia papyrifera, Casuarina equisetifolia, Colocasia antiquorum, C. Indica, Cordyline Baueri, Cyrtosperma edulis, Dammara macrophylla, D. Moorei, D. obtusa, D. ovata, D. vitiensis, Dioscorea aculeata, D. alata, D. nummularia, D. pentaphylla, D. sativa, Gossypium Taitense, G. tomentosum, Ipomœa paniculata, Kentia Baueri, K. Beccarii, Lagerstroemia Indica, Musa Troglodytarum, Ocimum gratissimum, Pipturus propinquus, Pringlea antiscorbutica, Ptychosperma Arfakiana, Rubus Hawaiensis, Saccharum officinarum, Santalum Freycinetianum, S. Yasi, Solanum Uporo, Spondias dulcis, Stilbocarpa polaris, Tacca pinnatifida, Tetragonia expansa, Touchardia latifolia, Vaccinium penduliflorum.

INDEX TO VERNACULAR NAMES.

	Page
Abele	254
Acacia Locust	282
Acajou wood	66
Adam's Needle	353
Adeira	56
Agallochum	28
Agath Dammar	96
Aggur	28
Alder	19
Alerce	132
Alexandra Palm	264
Alfalfa	180
Algaroba	258
Algaroba Tree	*ib.*
Alisander	312
Alkanna	172
Alkannet	171
Almond Tree	259
Aloe, gigantic	14
„ yellow-flowered	20
Aloe-wood	28
Aloja	258
Angico-gum	248
Anise	230
Apple, Crab	266
„ Haw	85
Aracacha	210
Arbor vitæ	327
Aracua	12
Argan Tree	31
Arhar	26
Arroche	38
Arrowroot	178
Artichoke	92
Ash	134, 135
Aspen, European	256
„ N. American	257
„ soft	255
*Atocha	318
Avens	138
Avocado Pear	221
Ayapana	123
Baboot Bark	1
Bad-jong	6
Bajree	220
Balm Herb	183
Bamboo Reed	34
Bamboos, 29, 33, 41, 42, 98, 139, 183,	300
Bamia Cotton	141
Bananas	190
Bandakai	148
Baneberry	12
Banyan Tree	129, 131
Barley	150
Barnyard Grass	212
Bartram's Oak	269
Basil	201
Bay Tree	325
Beach-plum	260
Bean, Straight	345
Beans	223, 224
Beebalm Tea	186
Beeches	125
Beet	44
Begoon	313
Bent Grass	15, 261
Berbery	43
Bermuda Grass	92
Besswood Tree	328
Bilberry	342
„ British Bog	343
Birch	45, 46
Bird's-foot Trefoil	173
Black Butt Tree	116
„ Gum Tree	200
Blackberry	287
„ Sand	*ib.*
Blackthorn	261
Blackwood	6
Bloodwood Tree	110, 120
Blue Grass	15
„ Gum Tree	111
„ Palmetto	276
Blueberry, early	343
„ Swamp	341
Bluets	342
Bokhara Clover	182
Bog Bean	184
Boldo	222
Box Elder	9
„ Trees	51, 113, 115
Bramble	287
Brasiletto-wood	220
Brazil-wood	52
Brea turpentine	247
Bread Fruit Tree	33
Bringal	313
Broom Bush	94
Broom Corn	25
Broussa Tea	340
Buckthorn	275
Buck Wheat or Beach Wheat	124
Buffalo Berry	310
„ Grass, 51, 310,	317
Bul Pine	236
Bunch Grass	106
Bunya Bunya	29
Butter Tree	80
Butternut Tree	159
Buttonwood	249
Cabbage	257
„ Kerguelen	*ib.*
Cabul Clover	182
Cactus	68, 206, 207
Caffir Corn	25
Cainito	200
Cajaput Tree	181
Calambac	28
Calool	318
Camata	*ib.*
Camatena	267
Cambuca	178
Camphor Tree	75
Canada Rice	356
Canary Grass	223
Candlenut Tree	18
Canelo	104
Cape Gooseberry	229
Caper-plant	57
Caraway	59
Cardoon	92
Carob Tree	68
Carrot	98
„ Tree	326
Cartagena Bark	72
Cashaw Tree	258
Cassava	177
Cassia Bark	75
Castor Oil Plant	281
Cat	66
Catechu	2
Catjang	58
Cat's-tail Grass	225
Cavan	2
Caviuna-wood	95
Cedar, Bastard	308

	Page
Mahin	299
Mahogany Tree	114, 320
Mahwa	358
Maize	354
Mallee	116
Mammoth Tree	308
Mango Tree	177
Mangold Root	44
Mangrove Tree	324
Manna Grass	252
„ Gum Tree	120
Manniu	194
Manoa	94
Maples	8, 9, 10
Marjoram	209
Marmalade Tree	11
Marmeladinha	18
Marrem	261
Marsh Mallow	22
Mastic Tree	248
Matai	146, 196
Maté	154
Matz	240
Meadow Fescue	127
„ Foxtail-Grass	21
„ Grass, English	253
„ Pea	165
„ Saffron	79
Medick	179
Medlar	85
Melon	88
Mesquite Grass	214
Messmate Tree	115
Mignonette	275
Millet Grass	185, 211
Millets	26, 212, 213
Millfoil	10
Mint, Mountain	266
„ Plants	183, 184
Miro	195
Mitchell Grass	37
Monk's Hood	11
Moram	261
Moreton Bay Fig	131
Morrel	116, 186
Mortina	342
Mosquito Grass	214
Mossy-cupped oak	268
Mountain Ash	107, 121
Muermo	122
Mulberries	186, 189
Mulga Grass	198
Mullein	156
Mustard	49
Myall Trees	1, 5, 6
Myrobalams	325
Myrtle wood	125
Myrtles	193, 194
Nasturtium	336
Ngaio	192
Nika Palm	163
Ningala Bamboo	33
Nonda Tree	217
Norfolk Isld. Palm	163
Notra	106
Nuble	12
Nut Pine, Nepal	236
Nut Trees	60, 84, 176
Oak Chestnut	269
Oaks	267—274
Oat Grass	39
Ochro	148
Ohelo	343
Olive	201
Onion, ordinary	19
„ Welsh	*ib.*
Ooyala Yam	101
Orange	76
Orchard Grass	15
Orchil	283
Oregon Red Cedar	326
„ larch	242
Orris root	157
Orseille	283
Osage Orange	176
Osiers	293, 294
Oswego Tea	186
Oyster Mushroom	14
Pa-Koo	139
Palisander Wood	95
Palixander „	158
Palmetto, Blue	276
„ dwarf	290
Palm Lilies	83
Palms	78, 79, 163, 250, 264
Palmyra	47
Pampas Grass	34
Paper Mulberry	50
Papyrus	93
Para Grass	214
Parsimon	103
Parsley	60
Parsnip	222
„ Chervil	69
Passion Flowers	218, 219
Pea, common	249
Pea-Nut	29
Pea Tree	58
Peach Palm	40
Pearl Grass	182
Pear, Snow	266
Pecan-Nut Tree	61
Pelu	315
Pencil Cedar	160
Penny-royal	146, 184
Pennsylvania Green Grass	253
Pepino	313
Peppermint	107, 183
Persimmon	103
Peru Bark trees	72, 73
Petsi	146
Pine, Aleppo	237
„ American Pitch	245
„ „ White	247
„ Bishop's	241
„ Black	195
„ Bootan	236
„ Brazilian	29
„ Broom	231
„ Canary	233
„ Cheer	239
„ Cluster	243
„ Corsican	238
„ Dye	248
„ Emodi	239
„ Frankincense	247
„ Georgia	231
„ Giant	238
„ Golden	*ib.*
„ Grey	*ib.*
„ Hudson's	245
„ King	248
„ Loblolly	247
„ Lofty	236
„ Long-leaved Yellow	231
„ Mahogany	196
„ Mexican Swamp	234
„ Moreton Bay	29
„ Norfolk Island	*ib.*
„ Nut	240
„ Okote	247
„ Oregon	235
„ Pitch	245
„ Pond	246
„ Red	245
„ Screw	211
„ Shake-Giant	298
„ Southern	231
„ Stone	240, 243
„ Sugar	238
„ Swamp	231
„ Torch	247
„ Trucker	244
„ Weymouth	247
„ White	236, 246
„ „ of New Zealand	195

Page

Pine, Yellow, of North America . 240
„ Yellow, of Puget Sound . . 235
„ Yellow Pitch 231, 244
Pinkroot 316
Pino Nut 235
Piquillin Bush . . 81
Pisang 191
Pita-fibre 14
Pitaya Bark . . . 72
Pitury 104
Plane, spurious . . 9
„ Trees . 249, 250
Plantain 191
Plum Juniper . . . 161
Plums 259
Pocoon, Yellow . . 153
Pomegranate . . . 265
Pompelmos . . . 76
Poplars 171, 255, 256
Poppy 215
Potato 314
Prairie Turnip . . 264
„ Grass . . 50
Praong 358
Pride of India . . 181
Puchero 321
Pulas 51
Pulque 14
Pumpkin 89
Putchuck . . . 31
Pythagorean Bean . 197

Quamash 305
Quandong . . . 298
Quebracho . . . 35
Queule 12
Quirinca 2

Radish 274
Rambutan . . . 197
Ramee 46
Rampostan . . . 197
Ramtil Oil . . . 145
Raspberry . . . 288
„ Black . . ib.
Rata 168
Ratanhia Root . . 164
Rattlesnake Grass . 251
Rauli 126
Red Brazil . . . 52
„ Cedar . . . 162
„ Gum Tree 109, 118, 120
„ Mahogany . . 117
„ Pine 94
„ Sandal Wood . 264
Red-top Grass 15, 127

Page

Red-Wood Cedar . 308
Reulé 126
Rewa Rewa . . . 164
Rheea 46
Rhubarb 276
Rice 209
„ Canada . . . 356
„ Paper Plant . 126
Rima 94
Ringal 38
Roble 125
Romerillo dye . . 148
Rose Apple . . . 122
Roses . . . 283, 284
Rosemary . . . 285
Rosewood . . . 81
Rue 290
Rye 306
Rye-Grass . . 15, 172

Sabadilla . . . 305
Sacci 14
Safflower 59
Saffron 86
Sage, Garden . . 297
Saintfoin 206
Salad, Burnet . . 297
Sallow, British . . 293
Salmon-barked Gum-Tree 119
Salsify 330
Sal Tree 310
Samphire 86
Sandal Tree . . . 298
Sandstay 167
Sapodilla Plum . . 11
Sarsaparilla . . . 311
Sassafras Tree . . 299
Satin Wood . . . 71
Saunders 264
Savory, Summer . . 299
„ Winter . . ib.
Scarlet Runner . . 223
Scorzonera, Native . 185
Scotino 278
Scutch-Grass . . . 92
Sea Lyme-Grass . . 106
Senna 63
Seratella 208
Serradella . . . 208
Shaddock . . . 76
Shake-Giant Pine . 238
Shallot 19
Shamalo 213
Sheoaks . . . 64, 65
Silt Grass . . . 218
Silver Fir . . . 230
„ „ Californian 231

Page

Silver Fir, Great . 237
„ „ Cilician . 234
„ Tree . . . 168
Silvery Tree-Fern . 99
Singhara Nut . . 330
Siris Acacia . . . 17
Sisal hemp . . . 14
Sissoo Tree . . . 96
Sloe 261
Snake Root . . 31, 72
Soapwort 298
Soja 189
Solah 12
Soola Clover . . . 146
Sorrel, French . . 289
„ Kitchen . . ib.
„ Wood . . . 210
Soulkir 15
Sour Gum-Tree . . 200
Soursop 123
Spadic 107
Spear-Wood . . . 111
Speckboorn . . . 257
Spikenard . . . 196
Spinach 316
„ New Zealand 325
Spotted Gum-Tree . 114
Spruce, Black . 231, 241
„ Blue . . 240
„ Hemlock . 232
„ Norway . 234
„ Red . 235, 245
„ Tideland . 240
„ White . 231
Squash 88
Squill 340
Squirting Cucumber 104
Star Anis . . . 155
„ Apple . . . 11
Strawberries . 133, 134
Strawberry Tomato . 229
Stringy Bark Trees . 113, 115
Styrax Tree . . . 168
Sugar Cane . . . 290
„ Gum-Tree . 359
Sugi 87
Sulphur Root . . 222
Sumach 278
„ Staghorn . 279
Sumbul 124
Sunflower . . . 146
„ Artichoke . 147
Sunn hemp . . . 86
Sunt 1
Swamp Gum Tree . 110
Sweet Calamus . . 28
„ Fernbush . 80

	Page
Sweet Flag	12
" Gum-Tree	171
" Potato	156
Sweetsop	123
Sword Sedge	167
Sycamore Fig Tree	131
Tagasaste	93
Tallow Tree	124
Tamarack	242
Tamarak	234
Tamarind	321
Tanekaha	229
Tangleberry	137
Tanne	230
Tansy	322
Tapioca	177
Tare	346
" Lentil	346
Taro	80
Tarragon	32
Tata	123
Tea shrub	54
Teak	324
Teff	250
Teon-itsigo	98
Teosinte	121
Terra Japonica	2
Thimbleberry	288
Thyme, Garden	328
Tideland spruce	240
Timothy Grass	225
Tivoli Yam	101
Tobacco	198
Tomato	313
Tooart	112
Tree Mallow	166
Trucker Pine	244
Truffle	210
Truffle, Black	337
" Grey	*ib.*
" Red	338
Tuberose	254
Tuckahoe Truffle	210
Tuggur	28
Tule	292
Tulip Tree	171
" Wood	146
Tupelos	200
Turkey Oak	268
Turnips	50
Turnsole	87
Turpentine Tree	320
Tussock Grass	95
Ulmo	122
Umbrella Palm	163
Uvalho do campo	123
Uvi Yam	99
Valonia	267, 271
Vegetable Marrow	89
Vernal Grass	27
Vetch	346
" Wood	*ib.*
Violet	347
Vouvan	166
Walnut Tree	106, 160, 264
Wandoo	117
Wapatoo	292
Water Beach	58
" Lemon	219
" Melon	87
Waternut	330
Water-whorl Grass	251
Wattle, black	2
" golden	6
Wattle, green	6
" silver	4
Wax Myrtle	192
" Palm	69
" Tree	279
Weld	275
Wheat	335
Whin	338
White Cedars	90, 91, 169
" Fir, noble	241
" Gum-Tree	117
" Thorn	85
Whorl Grass, water	251
Whortle berry, Brit.	342
Wild Oat	39
Willow Oak	271
Willows	292–296
Windmill Grass	71
Winter Cherry	229
Woad	157
Wood Sorrel	210
Woodruff	35
Wormwood	32
Wungee	87
Yams	100
Yarrow	10
Yate Tree	110
Yellow Cedar	90
" Pocoon	153
" Wood	132
Yew	68, 323
" Western	324
York Gum Tree	113
Yoksun	358
Zeloak	157

Government Central Press.—No. 226 R. A. & C.—26-2-80.—750.